



## U.S. Consumer Product Safety Commission



The views expressed in this presentation are those of the CPSC staff and have not been reviewed or approved by, and may not necessarily reflect the views of, the Commission.



## Who is CPSC and what does it do?

- Independent Federal agency that regulates over 15,000 types of consumer products.
- Enforces 5 statutes including the Consumer Product Safety Act (15 U.S.C. §§ 2051-2084) and the Federal Hazardous Substances Act (15 U.S.C. §§ 1261-1278).
- The CPSC regulates most consumer and household products but NOT:
  - automobiles
  - drugs
  - Food, including alcohol and tobacco
  - maritime vessels
  - firearms and ammunition
  - airplanes and trains



## Two Primary U.S. Playground Safety Documents...

<ul style="list-style-type: none"> <li>• CPSC Publication #325, 2010...Public Playground Safety Handbook</li> </ul>  <p>Federal Guideline &amp; Recommendation</p>	<ul style="list-style-type: none"> <li>• ASTM F1487-07... Standard Consumer Safety Performance Specification for Playground Equipment for Public Use</li> </ul>  <p>National Voluntary Standard</p>
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## U.S. Organizations concerned with Playground Safety...

<ul style="list-style-type: none"> <li>• NPSI-National Playground Safety Institute</li> <li>• CPSC-Consumer Products Safety Commission</li> <li>• ASTM-American Society for Testing and Materials International</li> </ul>	<ul style="list-style-type: none"> <li>• IPEMA- International Playground Equipment Manufacturers Association</li> <li>• NPCAI-National Playground Contractors Association</li> <li>• NPPS-National Program for Playground Safety</li> </ul>
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## Playground Injuries

- >2,000 playground related injuries treated in emergency rooms annually
- Between the years 2001 and 2008:
  - 2,691 playground related incidents reported to CPSC
  - 44% were falls
  - 23% equipment related (breakage, tip over, design, or assembly)
- Children between 2-9 account for 83% of injuries
- Climbers are involved in more than 50% of these injuries
- **76% of non-fatal injuries to children occur on public playgrounds**



## Playground Fatalities

- Between the years 2001 and 2008:
  - 47 playground related fatalities
  - 27 fatalities from hanging or asphyxiation (head entrapment)
  - Average victim age = 5
- Playground related deaths involved:
  - Entanglement of ropes, leashes, or clothing
  - Falls
  - Impact from tip-overs or structure failure
- **70 percent of the deaths happen on home playgrounds.**



## Injury Trends

- Children ages 4 and under tend to suffer injuries to the face and head from playground-related injuries, while older children are more likely to injure arms or hands.
- Falls to the surface cause 70 percent of the injuries on playgrounds
- Entanglement of clothing, strings and ropes are the number one cause of deaths on playgrounds
- Other dangers include:
  - Head entrapment in equipment openings
  - Impact by moving swings
  - Tripping on loose equipment



## Hazards to Address

- Potential for falls from and impact with equipment
- Impact attenuating protective surfacing under and around equipment
- Potential head entrapment
- General hazards presented by protrusions, sharp edges, and crush or shear points.
- Layout of equipment on a playground
- Scale of equipment and design features related to user age
- Installation and maintenance procedures




## General Playground Considerations

1. Selecting the Site
  - Shading
  - Playground Layout
  - Accessibility
  - Age Separation
  - Age Group
  - Conflicting Activities
  - Sight Lines
  - Signage/Labeling
  - Supervision
2. Selecting the Equipment
  - Not recommended
    - Trampolines
    - Swinging gates
    - Giant slides
    - Climbing ropes not secured
    - Multiple occupancy swings
    - Rope swings
    - Trapeze bars
    - Swinging dual exercise rings



## General Playground Considerations

### 3. Surfacing

- One of the most important factors
- Shock absorbing surface less likely to cause a serious head injury
- Voluntary Standard ASTM F1292
- Protective Surfacing Not Needed:
  - Child standing or sitting at **ground level**
    - Sandboxes
    - Playhouses
    - Any activity when the child's feet remain in contact with the ground



## General Playground Considerations

### Selecting a Surface Material

- Unitary Surfacing
  - ❑ Rubber mats or tiles poured on site
  - ❑ ASTM F1292 data identifies critical height requirements
- Engineered Wood Fiber
  - ❑ Specific for playgrounds and subject to ASTM F2075
- Loose Fill Materials
  - May compress up to 25%
  - Require frequent maintenance due to displacement
  - Require good drainage
  - Winter (frozen ground) may change critical height requirements
  - Some loose fill may not meet ADA/ABA accessibility guidelines



## General Playground Considerations

### Loose Fill Requirements

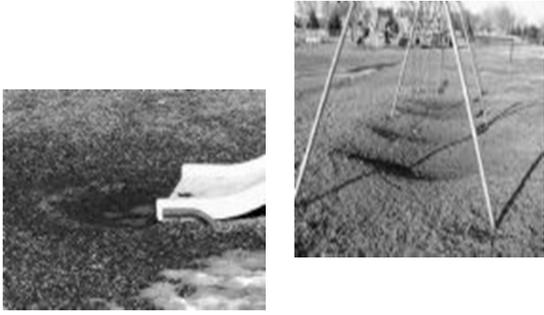
**Never use less than 9 inches except for shredded rubber**

Wood mulch from treated wood products should not be used (chromated copper arsenate)

Material	Inches of Fill	Fall Height (Feet)
Shredded Rubber	6	10
Sand	9	4
Pea Gravel	9	5
Wood Mulch	9	7
Wood Chips	9	10



## Surface Material Considerations




## General Playground Considerations

### 4. Equipment Materials

- Select equipment with a demonstrated record of durability and health safety in a playground setting
- Fasteners, connectors, coverings should be secured, smooth, and not likely to cause injury
- Bare metal platforms (slides, steps) heat up in direct sun
- Paint and finishes must meet CPSC regulation for lead
- Maintain painted and finished surfaces
- Wood should be rot and insect resistant
- Pre-12/31/2003 wood may contain chromated copper arsenate
- Ensure metal is compatible with wood treatment



## General Playground Considerations

### 5. Assembly and Installation

- Follow all manufacturer's instructions
- Manufacturer's assembly and installation instructions, and all materials, should be kept in a permanent file
- Secure anchoring is a key factor to stable installation
- A qualified person should inspect the equipment after assembly but before its first use.



## Playground Hazards

### 1. Crush and Shearing Points

Anything that could crush or shear limbs should not be accessible to children on a playground. Crush and shear points can be caused by parts moving relative to each other or to a fixed part during a normal use cycle, such as a seesaw.

Determining if there is a possible crush or shear point:

- The likelihood a child could get a body part inside the point
- The closing force around that point



## Playground Hazards

### 2. Entanglement and Impalement

Projections should not be able to entangle children's clothing nor should they be large enough to impale.

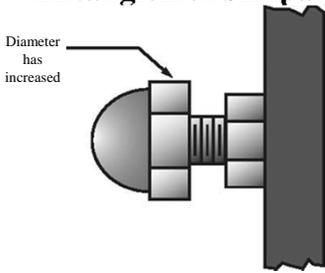
Drawstrings on the hoods of jackets, sweatshirts, and other upper body clothing can become entangled in playground equipment, and can cause death by strangulation. To avoid this risk:

Remove any ropes, dog leashes, or similar objects that have been attached to playground equipment. Children can become entangled in them and strangle to death.

Avoid equipment with ropes that are not secured at both ends.



## Entanglement/Impalement Hazard

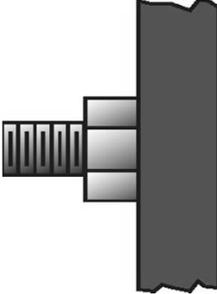


**To avoid this risk:** The diameter of a projection should not increase in the direction away from the surrounding surface toward the exposed end. Bolts should not expose more than two threads beyond the end of the nut. All hooks, such as S-hooks and C-hooks, should be closed. A hook is considered closed if there is no gap or space greater than 0.04 inches, about the thickness of a dime.

Example of a hazardous protrusion that increases in diameter from plane of initial surface and forms an entanglement hazard and may also be an impalement hazard.

**Entanglement/Impalement Hazard**

Example of a hazardous protrusion that extends more than 2 threads beyond the nut and forms an impalement/laceration hazard and may also be an entanglement hazard.



Any connecting device containing an in-fill that completely fills the interior space preventing entry of clothing items into the interior of the device is exempt from

**Entanglement/Impalement Hazard**

**WARNING**



Children have died when drawstrings on their clothing caught on slides or other playground equipment. Remove hood and neck drawstrings from children's clothing before children play on a playground. Remove scarves and mittens connected through the sleeves.

**Playground Hazards**

**3. Entrapment**

- Could lead to strangulation and death.
- Potential entrapment hazard:
  - if the distance between any interior opposing surfaces is **greater than 3.5 inches and less than 9 inches**. Even openings that are low enough for children's feet to touch the ground can present a risk of strangulation for an entrapped child.
  - Angles formed by two accessible adjacent parts should be **greater than 55 degrees** unless the lowest leg is horizontal or below horizontal
- A part or a group of parts should not form openings that could trap a child's head.

**Playground Hazards**

**3. Entrapment**

- A child's head may become entrapped if the child enters an opening either head first or feet first.
  - Head-first entry generally occurs when children place their heads through an opening in one orientation, turn their heads to a different orientation, then are unable to get themselves out.
  - Feet first entry involves children who generally sit or lie down and slide their feet into an opening that is large enough to permit their bodies to go through but is not large enough to permit their heads to go through.
- Entrapment incidents have occurred where children wearing their bicycle helmets became entrapped in spaces that would not normally be considered a head entrapment.

**Entrapment Hazards**

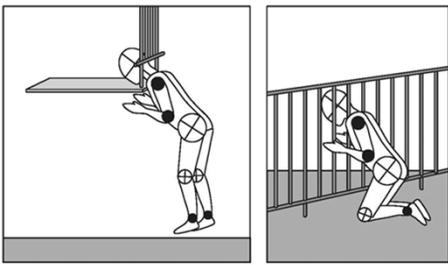
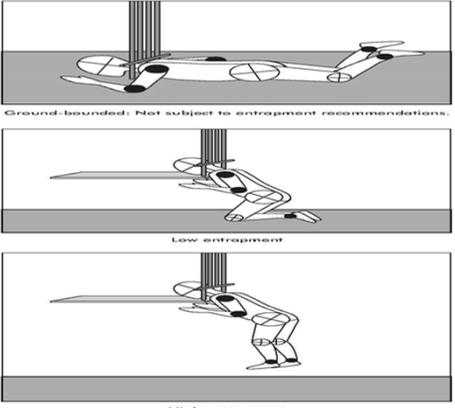


Figure 4. Examples of entrapment below a barrier and between the vertical bars of a barrier.

**Entrapment Hazards**

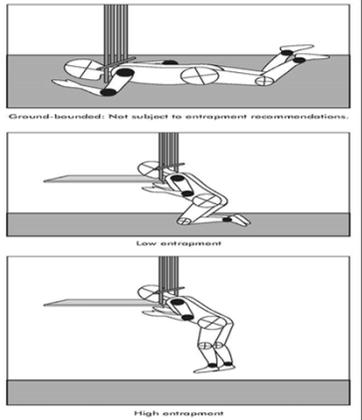


Ground-bounded: Not subject to entrapment recommendations.

Low entrapment

High entrapment

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Ground-bounded: Not subject to entrapment recommendations.

Low entrapment

High entrapment

**Entrapment Hazards**

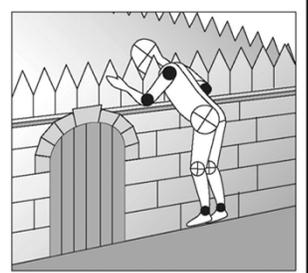


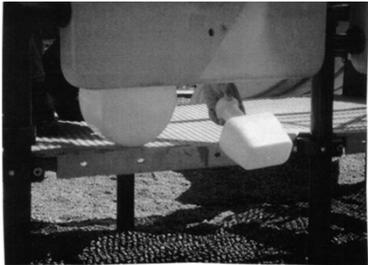
Figure 5. Example of entrapment in an angle less than 55 degrees on a fort.

**Entrapment Hazards**

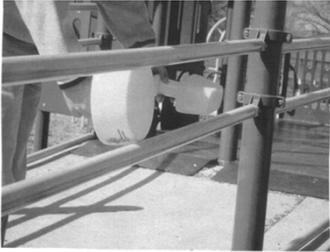


- Head entrapment areas are between 3.5" and 9"
- Angles formed by two accessible adjacent parts should be **greater than 55 degrees**
- The child's body can fit through a space that does not allow the head to pass through
- Even if the child's feet are on the ground, the child is in danger of strangulation

**Entrapment Hazards**



**Entrapment Hazards**



**Entrapment Hazards**



**Playground Hazards**

### 4. Sharp Points, Corners, and Edges

Sharp points, corners, or edges may cut or puncture a child's skin or cause serious lacerations if protective measures are not taken.

**Recommendations:**

- Exposed open ends of all tubing not resting on the ground or otherwise covered should be covered by caps or plugs that cannot be removed without the use of tools.
- 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.
- There should be no sharp edges on slides.
- Pay special attention to metal edges of slides along the sides and at the exit

**Playground Hazards**

### 5. Suspended Hazards

- Cables, wires, ropes, or similar flexible parts suspended between play units or from the ground to a play unit that are within 45 degrees of horizontal are considered suspended hazards.
- **Recommendations:**
  - Suspended components should not be located in high traffic areas.
  - Suspended components should either be brightly colored or contrast with surrounding equipment for added visibility.
  - Except for swings, any rope, cable, or chain longer than 7 inches should be fastened at both ends and should not be able to be looped back on itself to create a circle with a 5 inch or greater perimeter.
- These recommendations do not apply if the suspended component is more than 7 feet above the protective surfacing and is a minimum of one inch at its widest cross-section dimension.

**Suspended Hazards**

Entrapment hazard: when the perimeter of the net openings is between 17 inches and 28 inches

17 - 28 inches

**Figure 13. Entrapment hazards in flexible climbers**

**Playground Hazards**

### 6. Tripping Hazards

The two most common trip hazards are anchoring devices for playground equipment and containment walls for loose-fill surfacing materials.

All anchoring devices for playground equipment, such as concrete footings or horizontal bars at the bottom of flexible climbers, should be installed below ground level and beneath the base of the protective surfacing material. This will also prevent children from sustaining additional injuries from impact if they fall on exposed footings.

Contrasting the color of the surfacing with the equipment color can contribute to better visibility.

Surfacing containment walls should be highly visible.

Any change of elevation should be obvious.

Contrasting the color of the containment barrier with the surfacing color can contribute to better visibility.

**Playground Hazards**

### 7. Used Tires

- Steel-belted radials should be closely examined regularly to ensure there are no exposed steel belts/wires
- Ensure the tire does not collect water or debris (i.e. drainage holes)
- Recycled tire rubber mulch products should be inspected to ensure all metal has been removed
- ❖ Some plastic materials can be used as an alternative to simulate actual automobile tires

**Maintaining a Playground**

- **Maintenance Inspections**
  - Inspection for:
    - Excessive wear
    - Deterioration
    - Potential Hazards
  - Use manufacturer's provided checklist or Appendix A of Public Playground Safety Handbook

Table 3. Routine inspection and maintenance issues
<input type="checkbox"/> Broken equipment such as loose bolts, missing end caps, cracks, etc.
<input type="checkbox"/> Broken glass & other trash
<input type="checkbox"/> Cracks in plastic
<input type="checkbox"/> Loose anchoring
<input type="checkbox"/> Hazardous or dangerous debris
<input type="checkbox"/> Insect damage
<input type="checkbox"/> Problems with surfacing
<input type="checkbox"/> Displaced loose-fill surfacing (see Section 4.3)
<input type="checkbox"/> Holes, tears, and/or buckling of unitary surfacing
<input type="checkbox"/> User modifications (such as ropes tied to parts or equipment rearranged)
<input type="checkbox"/> Vandalism
<input type="checkbox"/> Worn, loose, damaged, or missing parts
<input type="checkbox"/> Wood splitting
<input type="checkbox"/> Rusted or corroded metals
<input type="checkbox"/> Rot



## Maintaining a Playground

- **Repairs**
  - Repairs and replacements should be completed per the manufacturer’s instructions.
  - User modifications such as loose-end ropes tied to elevated parts should be immediately removed
- **Maintain Loose-Fill Surfaces**
  - Check frequently
  - Under swings and slides for displacement
  - Pooling water
  - Frozen surfaces
- ❖ **Mark ideal surface depths on equipment poles**



## Maintaining a Playground

- **Recordkeeping**
  - Records of all maintenance inspections and repairs should be retained
    - Have person completing the work sign and date
  - Also retain:
    - Manufacturer’s instructions
    - Checklists
    - Records of any accidents or injuries



## Public Playground Safety Checklist

- Make sure surfaces around playground equipment have at least 12 inches of wood chips, mulch, sand, or pea gravel, or are mats made of safety-tested rubber or rubber-like materials.
- Check that protective surfacing extends at least 6 feet in all directions from play equipment. For swings, be sure surfacing extends, in back and front, twice the height of the suspending bar.
- Make sure play structures more than 30 inches high are spaced at least 9 feet apart.
- Check for dangerous hardware, like open “S” hooks or protruding bolt ends.
- Make sure spaces that could trap children, such as openings in guardrails or between ladder rungs, measure less than 3.5 inches or more than 9 inches.
- Check for sharp points or edges in equipment.
- Look out for tripping hazards, like exposed concrete footings, tree stumps, and rocks.
- Make sure elevated surfaces, like platforms and ramps, have guardrails to prevent falls.
- Check playgrounds regularly to see that equipment and surfacing are in good condition.
- Carefully supervise children on playgrounds to make sure they’re safe.

<http://www.cpsc.gov/en/Safety-Education/Safety-Guides/Sports-Fitness-and-Recreation/Playground-Safety/Public-Playground-Safety-Checklist/>



## Home Playground Safety Checklist

- **Install and maintain a shock-absorbing surface** around the play equipment.
  - 9 inches of wood chips, mulch, or shredded rubber for play equipment up to 7 feet high.
  - 9 inches of sand or pea gravel for play equipment up to 5 feet high.
  - Surfacing mats made of safety-tested rubber or rubber-like materials.
- Install protective **surfacing** at least 6 feet in all directions from play equipment.
  - Swings - surfacing extends, in back and front, twice the height of the suspending bar.
- **Never attach**- or allow children to attach-ropes, jump ropes, clotheslines, or pet leashes to play equipment.
- Check for **hardware**, like open “S” hooks or protruding bolt ends, which can be hazardous.
- Check for **spaces** that could trap children, such as openings in guardrails or between ladder rungs.
  - Spaces should measure less than 3.5 inches or more than 9 inches.
- Make sure platforms and ramps have **guardrails** to prevent falls.
- Check for **sharp points** or edges in equipment.
- Remove **tripping hazards**, like exposed concrete footings, tree stumps, and rocks.
- Regularly **check play equipment and surfacing** to make sure both are in good condition.
- Carefully **supervise children** on play equipment to make sure they are safe.

<http://www.cpsc.gov//PageFiles/122140/pg1.pdf>



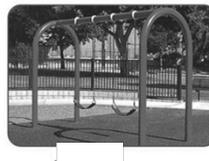
## Parts of the Playground

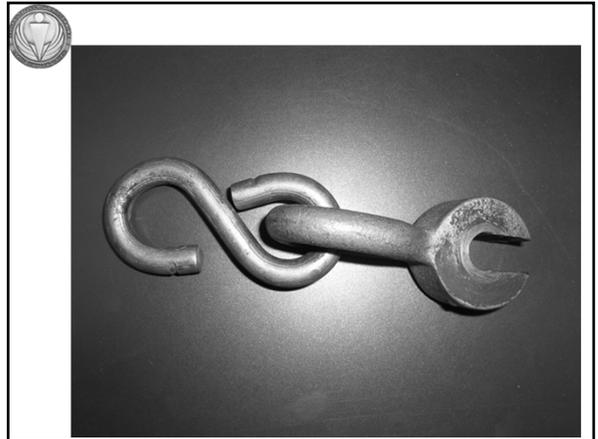
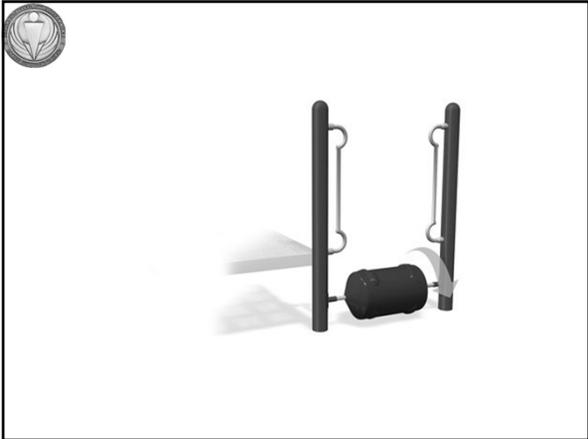
**Chapter 5 of the Public Playground Safety Handbook identifies each part or component of the playground along with safety specifications for that part.**

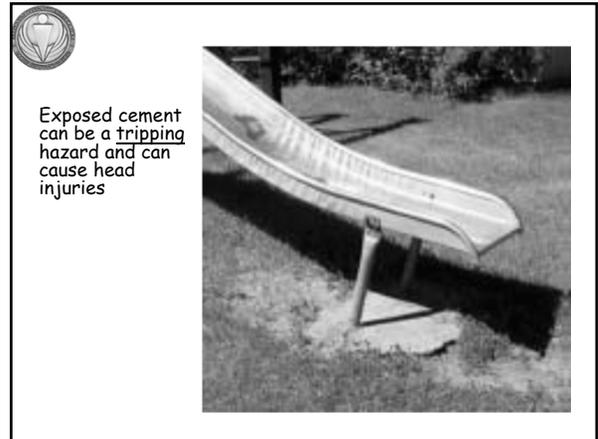
**Please reference this chapter for those components or parts specific to your situation.**



## Group Discussion







## References

- **Public Playground Safety Handbook**  
<http://www.cpsc.gov/en/Media/Documents/Safety-Education/Safety-Guides/Sports-and-Recreation/Playground-Safety/325/>
- **Outdoor Home Playground Safety Handbook**  
<http://www.cpsc.gov/en/Media/Documents/Safety-Education/Safety-Guides/Sports-and-Recreation/Playground-Safety/324/>
- **Home Playground Safety Checklist**  
<http://www.cpsc.gov/en/Media/Documents/Safety-Education/Safety-Guides/Sports-and-Recreation/Playground-Safety/pg1/>



## References

- **Public Playground Safety Checklist**  
<http://www.cpsc.gov/en/Safety-Education/Safety-Guides/Sports-Fitness-and-Recreation/Playground-Safety/Public-Playground-Safety-Checklist/>
- **Guidance for Outdoor Wooden Structures**  
<http://www.cpsc.gov/en/Media/Documents/Safety-Education/Safety-Guides/Home-Outdoors-Garden/270/>



## Additional Resources

<http://www.cpsc.gov/en/Safety-Education/Safety-Guides/Sports-Fitness-and-Recreation/Playground-Safety/>

- Soft Contained Play Equipment Safety Checklist
- Never Put Children's Climbing Gyms On Hard Surfaces, Indoors Or Outdoors Alert
- Strangulation Hazard with Playground Cargo Nets Alert
- Burn Safety Awareness on Playgrounds Alert
- Safer Playgrounds, Safer Play for Kids Poster
- Playground Safety Poster