

**ENERGIZING RISK MANAGEMENT**  
 PRIMA'S 2015 ANNUAL CONFERENCE • JUNE 7-10, 2015 // HOUSTON, TX



**Public Playground Safety: Don't Play with Inspections!**




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**What is MIRMA?**



- 76 municipalities
- Missouri's First Pool for cities
- All lines-worker's compensation to general liability
- Intensive focus on law enforcement and utilities
- "No Bid" language may be helpful to you...

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**Come to Terms:**

- 1. CPSC-Consumer Product Safety Commission  
<http://www.cpsc.gov/PageFiles/122149/325.pdf>
- 2. ASTM-American Society for Testing & Materials  
<http://www.astm.org/>





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### CPSC: What it's not...

- Amusement park equipment
- Sports or fitness equipment
- Soft contained play equipment
- Constant air inflatables
- Art and museum sculptures
- Equipment found in water play facilities
- Home playground equipment




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### More terms via the ASTM:

Standards within the ASTM program: Some of these will come with your manual in a CPSI class, some will not. Outright purchases of the standards are possible at ASTM.org

ASTM 1487 Standard Consumer Safety Performance Specification for Playground Equipment for Public Use \$74.00

ASTM 1292 Standard Specification for Impact Attenuation of Surfacing Materials Within the Use Zone of Playground Equipment \$62.00

ASTM 1951 Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment \$43.00

ASTM 2075 Standard Specification for Engineered Wood Fiber for Use as a Playground Safety Surface Under and Around Playground Equipment \$43.00

ASTM 2223 Standard Guide for ASTM Standards on Playground Surfacing \$38.00




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### More terms via the ASTM:

ASTM 1918 Standard Safety Performance Specification for Soft Contained Play Equipment \$62.00

ASTM 2049 Standard Safety Performance Specification for Fences/Barriers for Public, Commercial, and Multi-Family Residential Use Outdoor Play Areas \$43.00

ASTM 1148 Standard Consumer Safety Performance Specification for Home Playground Equipment \$69.00

ASTM 2373 Standard Consumer Safety Performance Specification for Public Use Play Equipment for Children 6 Months through 23 Months \$69.00




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## Why Playground Safety?

Between 2001 - 2008, an average of 218, 851 preschool and elementary children received emergency department care for injuries that occurred on playground equipment.

- 51% of the injuries happened on public playground equipment
- 19% occurred on home playground equipment
- 20% not recorded
- 1% Other

Source: CPSC October 29, 2009

Of the incidents reported

- 67% involved falls or equipment failure
- 8% hazards around but not related to the equipment
- 7% collisions with other children or the equipment
- 7% entrapments
- 11% other

Approximately 15% of the injuries were classified as severe, with 3% requiring hospitalization.

Source: CPSC October 29, 2009



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## Why Playground Safety?

40 deaths were associated with playground equipment between 2001-2008.

- Average age was 6 years; median age was 4 years.
- 27 deaths were the result of hangings or other asphyxiations
- 7 deaths were the result of head or neck injuries

Source: CPSC October 29, 2009

Top four equipment pieces associated with injuries

- Climbers- 23%
- Swings- 22%
- Slides- 17%
- Overhead ladders- 9%

Source: CPSC October 29, 2009



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## Why Playground Safety?

Most Common Injuries are

- Fractures- 36%
- Contusions/Abrasions- 20%
- Lacerations- 17%
- Strains and Sprains- 12%
- Internal/ Organs- 5%
- Concussions- 2%
- Other- 3%

Source: NEISS Database, May 2009

NEISS: National Electronic Injury Surveillance System  
<http://www.cpsc.gov/en/Research-Statistics/NEISS-Injury-Data/>  
--Hospital injury reporting system developed by the CPSC.



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### What drives inspections?

- Self Insurance Pool Policies and Inspections
- Entities Policy (influenced by your pool, insurance)
- Recommendations by the playground manufacturer
- Popularity of playground/use

#### High Frequency Inspection:

- Daily or routinely (weekly is ok per documentations)
- Daily is possible with the help of mowing crews, maintenance folks, and a general focus on observation of all employees.

#### Low Frequency

- Lubricate swings, check for wear, check for loose hardware, surfacing evaluated.

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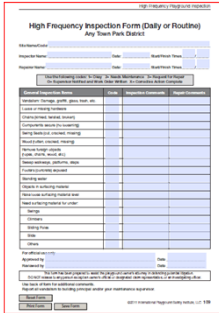
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### High Frequency Inspection Form




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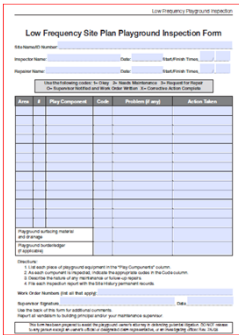
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### Low Frequency Inspection Form



#### IMPORTANT NOTES

- Always follow manufacturers guidance on repairing structures.
- Never modify the structure without the written permission of the manufacturer.
- Order parts from the manufacturer.
- Use recommendations from the manufacturer in the low frequency inspections.

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### Certifications & Bidding Guidance:



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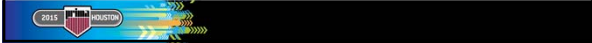
### The Goal:

Properly:

- 1. Designed
- 2. Constructed
- 3. Inspected facility



Avoid Contractor vs Supplier vs Entity vs Importer



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ASTM vs CPSC vs State/Local Laws and how ADA weaves through these rules

[Arkansas](#), [California](#), [Connecticut](#), [Florida](#), [Illinois](#), [Michigan](#), [New Jersey](#), [North Carolina](#), [Oklahoma](#), [Oregon](#), [Rhode Island](#), [Tennessee](#), [Texas](#), [Utah](#), [Virginia](#), [Wyoming](#)



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### The Standards...

- CPSC and ASTM Certifications are totally separate
- CPSC certification can be done by letterhead but be careful of imported panels and toys.
- Imported play pieces can be certified (CPSC) with a "Children's Product Certificate".
- ASTM certifications are published on websites and via letterhead as well.
- IPEMA, made up of over 100 companies, is a third party evaluator and certifies to both CPSC and ASTM standards.



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### After the playground is built...

- Before the entity accepts the playground in its inventory, the entity (according to the contract) should require a statement from the designer or manufacturer or both that "as built", the playground conforms to CPSC and ASTM Standards.
- Surfacing might not be a part of the contract, but if it is, it too should be tested to verify its quality.
- IPEMA has a certification for surfacing as well:



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### Resources:

- Certified Playground Safety Inspector Class, NRPA <http://www.nrpa.org/CPSI/>
- CPSC <http://www.cpsc.org/>
- ASTM <http://www.astm.org/Standards/F1487.htm>
- CPSIA <http://cpsia.playcore.com>
- IPEMA [www.ipema.org](http://www.ipema.org)
- ADA Access Board [www.access-board.gov](http://www.access-board.gov)
- ADA-Other info [http://www.ada.gov/2010ADASTandards\\_index.htm](http://www.ada.gov/2010ADASTandards_index.htm)
- <http://www.playgroundsafety.org/standards/regulations>



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## Playground Protective Surfacing

- Insufficient surfacing material is the leading cause of injury.



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## Playground Protective Surfacing

- Impact Attenuating Surfacing- protective surfacing with impact absorption properties to minimize the likelihood of a life-threatening head injury.
- ASTM-F 1292 Test method – establishes an impact performance criterion for playground surfacing material.
- ASTM International, formerly known as the American Society for Testing and Materials (ASTM).



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## ASTM 1292 Test Method

- ASTM F1292 only addresses serious HEAD INJURY!!!
- All surfacing material should be tested, using ASTM F1292.
- G-Max- the maximum acceleration of a head during impact is not to exceed 200g
- HIC (Head Injury Criteria)- a measure of the impact severity that combines both the time and energy of an impact is not to exceed 1000 HIC



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### Critical Height

- Is the maximum height in full feet for a surfacing system (or surfacing material) that when tested in accordance with ASTM F 1292, no value shall exceed 200 g or 1,000 HIC.
- The fall height from below which a **life-threatening head injury would NOT be expected to occur.**



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### Fall Height of Play Equipment

- The vertical distance between the highest accessible designated play surface of the play equipment and the protective surfacing beneath it.



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### Fall Heights

- Heights of pivot point to the surfacing material.



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### Fall Heights

- Height of transition platform to the surfacing material.




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### Exceptions to Protective Surfacing

- Ground level play devices or structures used in a standing or seated position with feet on the ground.




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### CPSC

Table 2. Minimum compressed loose-fill surfacing depths

Inches	Of	(Loose-Fill Material)	Protects to	Fall Height (feet)
6"		Shredded/recycled rubber		10
9		Sand		4
9		Pea Gravel		5
9		Wood mulch (non-CCA)		7
9		Wood chips		10

\* Shredded/recycled rubber loose-fill surfacing does not compress in the same manner as other loose-fill materials. However, care should be taken to maintain a constant depth as displacement may still occur.




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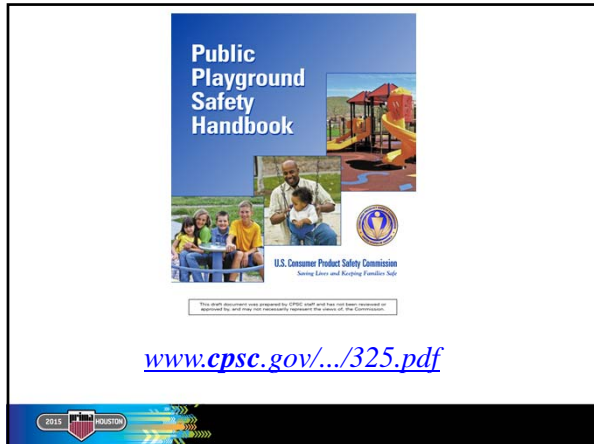
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### Fall Zone/Use Zones

- Its function is to reduce the severity of head injuries due to falls.

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### Fall Zone/Use Zones

- The area beneath and immediately adjacent to a play structure or equipment that is:
  - Designated for unrestricted circulation around the equipment.
  - On whose surface it is predicted that a user would land when falling.

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### Fall Zone/Use Zones

Must meet the ASTM F1292

Must meet ASTM F1487 criteria for placement under and around play equipment.



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### Fall Zone/Use Zones for Stationary Equipment

- 72 inches (6 feet) minimum in all directions from the equipment perimeter.



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### Overlap of a Fall/Use Zone

- If both structures are 30 inches or less 72 inches minimum overlap.
- If both structures are over 30 inches a 108 inches (9 Feet) minimum overlap.



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### Rotating Equipment with Platform Diameter GREATER than 20 inches

- No overlap of the fall/ use zone with any other fall/use zones.



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### Rotating Equipment with Platform Diameter LESS than 20 inches

- Fall/Use zones may overlap.



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### Overlap of a Fall/Use Zone

- The fall/use zone at the end of the swing MAY OVERLAP other equipment use zones with a minimum of 108 inches between both structures.



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### Swings Fall/Use Zone

- The fall zone for a swing set should be twice the height of the swing set, measured from the pivot point to the protective surface, front to back. 108 inches (9 feet) between swings.



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### Tot-Swings Fall/Use Zone

- The fall zone for a tot-swing should be twice the height of the swing set, measured from the pivot point to the top to the sitting surface, front to back. 108 on the sides



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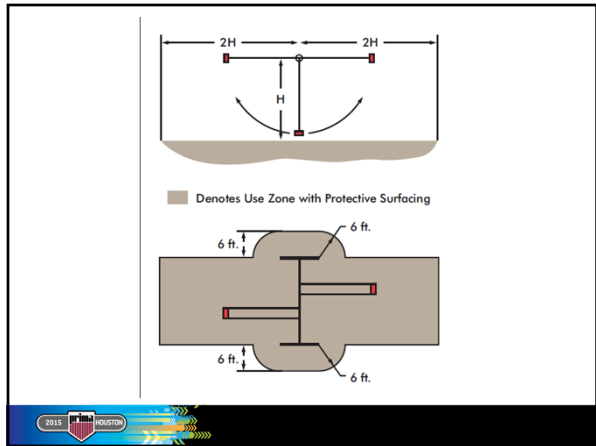
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### Rotating Swings Fall/Use Zone

- The fall zone/use zone for a rotating swing shall be a minimum horizontal distance of  $Y+72$  inches in all directions from the pivot point of the swing.
- Y equals the vertical distance between the pivot point and the top of the swing seat or suspended member.
- **NO OVERLAP** of the fall zone/use zone.




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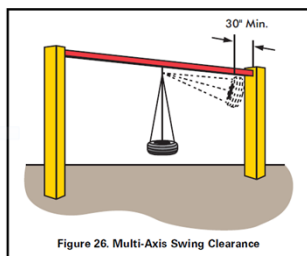
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### Rotating Swing Fall Zone/ Use Zone

- The swing bay clearance zone ( $Y+30$ ) and shall **NOT OVERLAP**.




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### Free Standing or Attached Slides

- Side and rear of slides- 72 inches (6 feet) minimum fall/use zone. And cannot overlap.
- Exit region of slide 72 inches (6 feet) minimum fall/use zone. 96 inches (8 feet) maximum.




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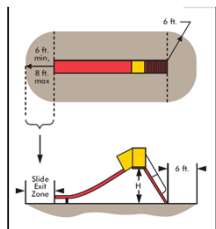
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### Free Standing or Attached Slides

- So if you had an 84 inch (7 feet) high slide, your exit zone should be 84 inches (7 feet).



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### Free Standing or Attached Slides

- If your slide is 10 feet high how big should your exit fall/use zone be?



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### Functionally Linked Play Structure

- Is a play structure that acts as a single unit in its sense of function as continuous play even if components are not physically linked.
- The fall/use zone are determined as if they were part of a composite structure.



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## Play Panels

- Play panels **do not need** a fall/use zone.



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## Composite Play Structure

- Is two or more play structures attached or play functionally linked, to create one integral unit that provides more than one play act.
- Fall/use zone is 72 inches (6 feet).
- Slide exits min. 72 IN, to Max 96 IN.



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## Two Important Documents

- Consumer Product Safety Commission, (CPSC) Publication No. 325. This document covers the typical user ranging in age from 2 to 5 and 5 to 12 years of age
- American Society for Testing Materials, (ASTM) F1487-01. The range of the users covered by this document is the 5<sup>th</sup> percentile 2 year old through the 95<sup>th</sup> percentile 12-year old



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### The Following is Not Recommended:

- Animal Swings: Ordered removed in 1995 by CPSC
- Other play equipment that is not recommended for public playgrounds: swinging gate, trapeze bars and swinging exercise rings, and trampolines



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### ASTM Excludes

- Residential Equipment
- Athletic Equipment
- Contained Equipment
- Amusement Park
- Fitness
- Toys
- Equipment located outside use zone and moved around



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### Major Causes of Death

- #1 Entanglement
- #2 Falls
- #3 Neck Entrapment
- #4 Impact



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### Head and Neck Entrapments

- Completely Bounded Rigid Opening
- Completely Bound Non-rigid Opening
- Partially Bounded Opening
- Test Procedures



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### Completely Bounded Rigid Opening

- Any opening in a piece of play equipment that is totally enclosed by boundaries on all sides so the perimeter of the opening is continuous
- Hazard: Head Entrapment
- Note: The higher the location the greater the risk
- Is considered a head entrapment if the opening is typically greater than 3.5" and less than 9"



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### How to Test a Completely Bound Rigid Opening

- Torso Probe:
  - Insert the torso probe first.
  - If the torso probe goes through, the opening is accessible
- Head Probe:
  - If the opening is accessible, insert the head probe
  - If the head probe will not penetrate the opening, the opening is considered a head entrapment
- Each probe must be inserted at least 4"



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### Completely Bounded Non-rigid Openings

- Openings in flexible nets, tarps, and plastic enclosures is considered accessible if a torso probe will penetrate the opening to a depth of 4" or more
- Opening passes the test if:
  - The opening does not allow the torso probe to enter
  - The opening allows for passage of the torso probe and also the head probe to completely pass
  - It fails if it allows the torso probe, but not the head probe



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### Other Information

- Inspect all openings on an arch climber for head entrapments because they will vary in size.
- Pay close attention to openings between support posts and barriers or other panels.
- Improper installation can be a problem.
- Inspect openings in tot swing seats.



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### Partially Bounded Openings

- Any opening in a piece of play equipment that is not totally enclosed by boundaries on all sides so that the perimeter of the opening is discontinuous
- Hazard: Neck Entrapment
- Note: Not all partially bounded openings are hazardous



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### Testing a Partially Bounded Opening

- Check for neck entrapment using “Fish Probe”
- Hold the probe parallel to the face of the opening, then insert probe along the centerline of the opening.
- If the “A” portion of the probe touches the bottom of the opening without touching both sides of the opening is not a neck entrapment. No further testing needed.
- If the “A” portion touches both sides of the opening before touching the bottom, it must be tested using the “B” portion of the probe.




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### Testing a Partially Bounded Opening

- “B” test method:
- Lower the “B” portion of the probe down into the opening. Keep the probe parallel with the top of the opening.
- If the “B” portion of the probe can be fully inserted in the opening, the opening is a neck entrapment.
- If the “B” portion of the probe cannot be fully inserted in the opening, the opening is not a neck entrapment
- Inserted more than 3/4” – thickness of probe.




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### Partially Bounded Opening Exceptions

- Flexible components – Where contact with sides of the opening is less than 24” above the protective surface
- Lower leg of opening is horizontal or pointed downward
- Angles formed by two accessible adjacent parts less than 55 degrees where the apex of the angle is formed by an inclined or vertical climbing surface.
- Rope, chain, or cables are exempt if the rope, chain, or cables are in contact with the inclined surface at or below the protective surface at the point of the “V”.




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### Protrusion Gauges

- The sizes are based on the anthropometric measurement:
- The smallest gauge = Thickness of skull
- The middle gauge = Entering brain though eye socket
- The largest gauge = Prevents soft tissue injuries
- The washer-like gauge is used to check for entanglement hazards on suspended components, such as a swing



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### How to Test

- Place each gauge over each accessible projection in all orientations
- Determine whether the project extends beyond the face of any gauge
- The projection fails the test and is a protrusion if it extends beyond the face of any of the three gauges



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### Test Swing Seat Protrusions

- Test in all positions of its intended path of travel
- Hold .12" gauge vertically with its axis parallel to the plane of travel, test all projections on the front, underside, and rear of the swing seat
- If the projection passes through the face of the gauge, it is a protrusion



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### Test Compound Projections

- Successively place each of the three gauges over each accessible projection in all orientations
- Determine whether the projection extends beyond the face of any of the gauges
- Projection fails if it extends beyond the face of any of the gauges
- See example



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### Entanglement Protrusions

- Top of swings and along slides bigger concern!!
- A projection that has a potential means to catch a loose cord, hood, or other item is an entanglement hazard
- Need: Three test gauges and a .12" vertical projection gauge



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### Entanglement Protrusions

- A projection is not an entanglement hazard unless 4 conditions are present:
  - Projection must fit within a projection gauge
  - Projection must be above horizontal
  - Projection must have perpendicular sides
  - Projections must extend greater than .12" from initial surface



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### Slide Non-Entanglement Zone

- A projection that meets both of the following requirements is an entanglement hazard:
  1. One of the three protrusion gauges passes over and makes contact with the initial surface
  2. Projections greater than .12" are not allowed within the slide non-entanglement zone of 21", regardless of orientation of the projections
- Constructed in a matter to provide a continuous sliding surface



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### Other Projections

- More than 2 exposed bolt threads may be considered an entanglement hazard
- Recessed bolts - use the 3.5" gauge to test for bolt end accessibility. If the curved surface of the gauge touches the bolt, the bolt is accessible and cannot have more than 2 threads exposed



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### Projections That Increase in Size

- Any projection that fits within any of the three protrusion test gauges
- If the increase in size extends greater than .12" from the initial surface with a depth greater than .12" the space created is an entanglement hazard



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### S-Hooks

- When closed properly, not a problem
- Maximum opening for an S-hook is .04" or the thickness of a dime
- Exceptions to closed connecting devices includes devices that have an in-fill, such as plastic that completely fills the interior space of both loops preventing entry of clothing, such as flex net climber hardware



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### Connecting Device Rules

- If any of the following are not met an entanglement hazard exists:
- No portion of the closed end of an S-hook lower loop may project beyond the vertical boundary established by the upper loop
- S-hook upper loop may align with, may partially overlap, or may completely overlap the connector body, it cannot extend past connector body
- S-hook lower loop must align with the connector body and not overlap it in any way



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### Pinch, Crush, and Shear Points

- Opening must have movement to be crush hazard!
- Movement of suspension bridge
- Field tools to test crush and shear hazards:
  - Roller Slide: .19" diameter dowel
  - Merry-Go-Round: .30" diameter dowel
  - Common Crush/Shear: .62" diameter dowel



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### Exemptions to Crush-and-Sear Criteria

- Chains and method of attachment - swing
- Attachment area of coil springs to the body and base of rocking equipment –spring rockers
- Area between a top rail and swinging element – multi axle swing
- Area between lightweight moveable objects - play panels



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Thanks for attending!

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