Public Playground Safety

An information guide for schools, daycares and municipalities

MANITOBA
School Boards
ASSOCIATION

Forward

In 1988, MASBO-MAST (Manitoba School Boards Association) published a safety booklet entitled **Playground Safety Manual.** It was created for the use of school maintenance personnel and educators entrusted with designing playgrounds and supervising children at play.

Since this publication was distributed, there have been other guides and manuals issued by various agencies and in 1990 CAN/CSA Standard Z614 – Children's Playspaces and Equipment was published. In June 1990, the document was approved as a National Standard of Canada. The second edition was issued in 1998 – CAN/CSA-Z614-98 and this standard included a performance standard in relation to the protective surfacing required in order to reduce serious injuries from falls. The third edition was published in 2003 with clarified wording and improved information.

The CSA publication is the technical standard that shall be referred to in any discussion of playground safety and any new equipment or additions and replacement parts should meet the technical requirements of this standard.

The detailed requirements certainly have their place but many individuals and agencies have requested simple, workable guidelines and practices to help identify problem areas and provide and maintain safer playgrounds. We hear frequently that most workplaces spend in proportion a few weeks each year in maintaining and inspecting playgrounds in relation to a variety of other unrelated tasks. It is with these workers in mind, that this publication has been issued so that maximum safety benefits can be realized.

Introduction

This information guide provides guidelines for public playground equipment and looks at the safety of each piece of play equipment and the layout as a whole. It is important to see this information as a guideline and not mandatory requirements and there may be other methods that can be used to contribute to playground safety. We do believe that following the recommendations in this publication will help minimize playground injuries.

Each year in North America, it is estimated that over 200,000 children require medical attention because of injuries that occurred on a playground. The majority of playground injuries result from falls off playground equipment to the ground. Approximately three quarters of playground injuries are in the falls category and by maintaining good ground cover, we can go a long way in reducing injuries.

Designing Playgrounds

When planning a new playground, it is important to check the proposed site for potential hazards. Pick a location away from roads, driveways and parking lots. If this is not possible, then an appropriate fence should be constructed to keep children from running into dangerous areas. Visibility is very important so the fence should not in any way restrict supervision but allow clear sight lines.

The following points should be considered when planning a playground:

- Pick a site away from obstacles that could cause injuries such as low hanging tree branches, overhead wires, tree stumps and concrete.
- Check the location regarding drainage as heavy rains or melting snow can turn a play area into a swamp. Re-grading may help improve drainage.
- Place metal equipment, where feasible, out of direct sunlight to reduce the possibility of serious burns.
- Play equipment should be located over 1,800 mm (6 feet) from other play equipment, buildings, fences, trees, etc. Provide additional space in front of and behind swings.
- Do not crowd equipment together but instead organize different areas where active, physical activities are separate from passive activities. Sandboxes should not be located too close to a swing or slide. Ensure traffic patterns allow children to move safely from one piece of equipment to another.
- Playgrounds should have separate areas for younger children with suitable sized equipment and adequate space for greater supervision.

Size

Determine if the site is big enough to have a playground that meets your needs. The following items need to fit on that site:

- Play equipment.
- Protective surfacing that will extend up to 1,800 mm in all directions from the equipment.
- Non-encroachment zones beyond the protective surfacing area.
- Landscaping, seating, refuse containers, etc.

Community Support

School boards and municipalities each have their own requirements for playgrounds and their regulations take precedence over any measures provided in this manual.

Installation and Assembly

Follow the instructions carefully as provided by the manufacturer and ensure the equipment is securely anchored. Because of the forces generated by active use, proper anchoring is required to prevent overturning, sliding or tipping.

Anchors must be buried and covered with appropriate amount of protective surfacing.

Equipment cannot be installed once the ground is frozen so that May to September are the ideal months for playground construction.

Assembly of equipment should take place under the guidance of the manufacturer's representative or installed completely by a trained crew. No deviation is permitted from the manufacturer's instructions. There shall be clear and concise instructions and procedures for the installation of each play structure. Protective surfacing shall be installed as soon as possible following equipment assembly and the equipment shall not be used until this is done. The site shall be secure during construction when unattended to prevent children from playing on the site. Temporary barricades are required at unprotected openings of incomplete structures. All equipment must be thoroughly inspected before public use by the owner or representative.

The equipment must be kept in excellent condition as this is essential to reducing injuries. Keep a copy of the manufacturer's instructions and parts list so that worn or damaged components can be replaced.

Develop an all inclusive maintenance program for the entire playground. This shall include regularly scheduled inspections for corrosion and breakage to more frequent inspections for broken glass and vandalism.

The type of inspection will depend on the piece of equipment, amount of use and climatic conditions. Checklists should be developed for each playground item.

Inspections shall include:

- Checking the entire playground area for hazardous debris or litter.
- Checking for any damage such as broken or missing components whether due to wear or vandalism.
- Checking for broken or missing protective barriers, steps, guardrails, etc. and damage to benches, signs and fences.
- Checking for strings and ropes that have been tied onto the equipment and removing them.

Inspection Schedule

The following three types of inspections are recommended:

- **Daily/Weekly Visual Inspection**
  A visual inspection shall be carried out by the owner, maintenance inspector, care giver, or custodian on a daily basis, if possible, and at least once a week, to identify defects or emerging problems.

- **Detailed Monthly Inspection**
  A detailed inspection shall be carried out every month, and the results and actions taken entered in a permanent record that can be examined if necessary.

- **Annual Comprehensive Written Report**
  Every year, comprehensive written reports shall be completed by the owner or a representative, and the results and action taken (e.g. checking equipment below grade, physically testing equipment, conducting surveys of overhead hardware on ladders) shall be entered in a permanent record that can be examined if necessary.

Repairs in Playspaces

All repairs shall comply with the CSA Standard. When a defect is observed, it shall be immediately reported and repaired. Details of the defect or problem and remedial action shall be recorded. Should the repair take time, all reasonable steps shall be taken to bar access. Warning or danger signs alone shall not be acceptable. Damaged or worn components shall be repaired or replaced to the CSA Standard.

Maintenance and repairs to equipment and the replacement of components shall be carried out in strict compliance with the manufacturer's recommendations.

Hazards

Head and Neck Entrapment
A component or a group of components should not form openings that could trap a child's head. In general, an opening may present an entrapment hazard if the distance between any interior opposing surfaces is greater than 90mm and less than 225 mm. (3.5 inches and 9 inches)

Angles
The angle of any vertex formed by adjacent components should not be less than 55 degrees, unless the lower leg is horizontal or projects downwards. An exception can be made if a rigid shield is attached to the vertex between adjacent components and the shield is of sufficient size to prevent a 225 mm (9 inches) diameter circular template from simultaneously touching components on either side of the vertex.

Protrusions
Protrusions on playground equipment should not be capable of entangling children's clothing because such entanglement can cause serious injuries or

death by strangulation. All protrusions shall not extend beyond the face of any of the three test gauges shown in **Figure 5.**

Protrusions and Projections

Protrusions or projections on playground equipment should not be capable of entangling children's clothing, because such entanglement can cause death by strangulation. Particular attention should be given to avoid protrusions or projections on slides to minimize the risk of entanglement with clothing, jackets and sweatshirts with hoods and/or drawstrings have been involved in such entanglement/strangulation incidents. Jewellery, such as necklaces and rings, has also resulted in injuries from entanglement. The diameter of a protrusion should not increase in the direction away from the surrounding surface towards the exposed end **(see Figure 4).**

Figure 4

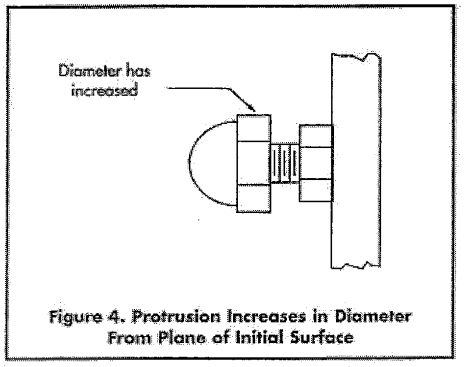


Figure 4. Protrusion Increases in Diameter From Plane of Initial Surface

Figure 6

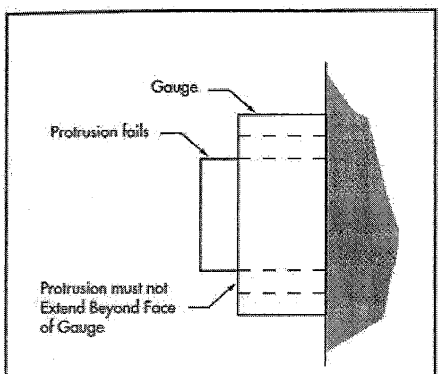


Figure 6. Protrusion Test

Figure 5

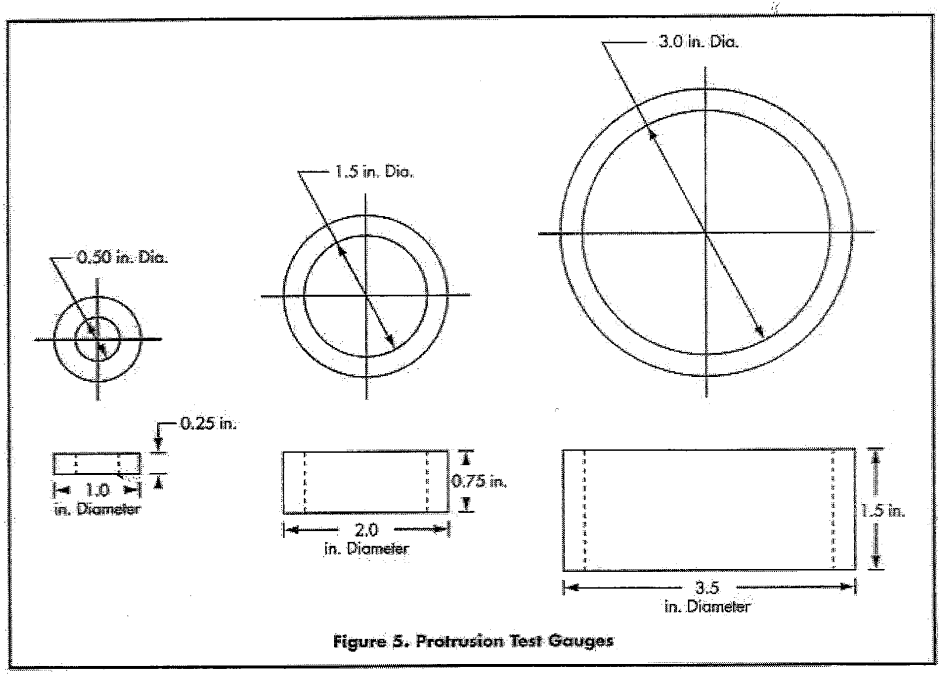


Figure 5. Protrusion Test Gauges

No protrusion should extend beyond the face of any of the three gauges having dimensions show in **Figure 5.** These gauges may be purchased from the National Recreation and Park Association (NRPA).

Protrusion Test Procedure

Successively place each gauge **(see Figure 5)** over any protrusion or projection and determine if it projects beyond the face of the gauge **(see Figure 6).**

Protrusions on Suspended Members of Swing Assemblies

Because protrusions on swings can be extremely hazardous, given the potential for impact incidents, a special test gauge **(see Figure 7)** and procedure are recommended. No bolts or components in the potential impact region on suspended members should protrude through the hole beyond the face of the specified gauge, when tested in accordance with the following method.

Figure 7

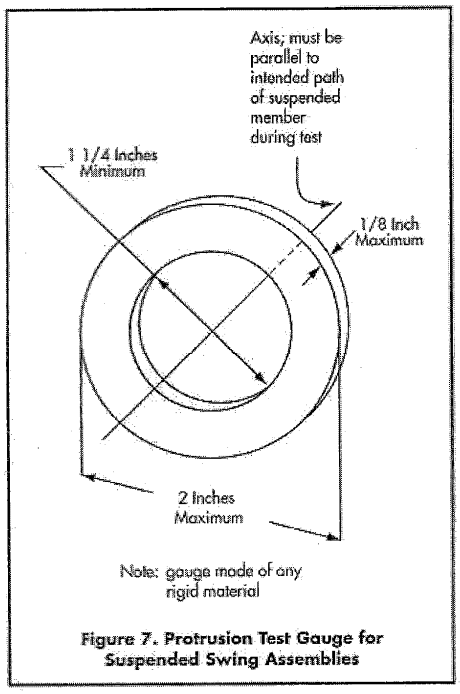


Figure 7. Protrusion Test Gauge for Suspended Swing Assemblies

Conduct the test with the suspended member in its rest position. Place the gauge over any protrusion on the front or rear surface of the suspended member such that the axis of the hole in the gauge is parallel to both the intended path of the suspended member and a horizontal plane. Visually determine if the protrusion penetrates through the hole and beyond the face of the gauge.

Protrusions that Project Upwards and Protrusions on Slides

To minimize the likelihood of clothing entanglement, protrusions that fit within any one of the three gauges shown in Figure 5 and also have a major axis that projects upwards from a horizontal plane should not have projections perpendicular to the plane of the surrounding surface that are greater than 1/8 inch **(see Figure 8).**

Sharp Points, Corners and Edges

There should be no sharp points, corners or edges on any components of playground equipment which could cut or puncture children's skin. Wood parts should be smooth and free from splinters. All metal edges should be rolled or have rounded capping.

Suspended Hazards

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. This applies to suspended members at a height of 2100 mm (7 feet) or less.

Tripping Hazards

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. 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.

Figure 8

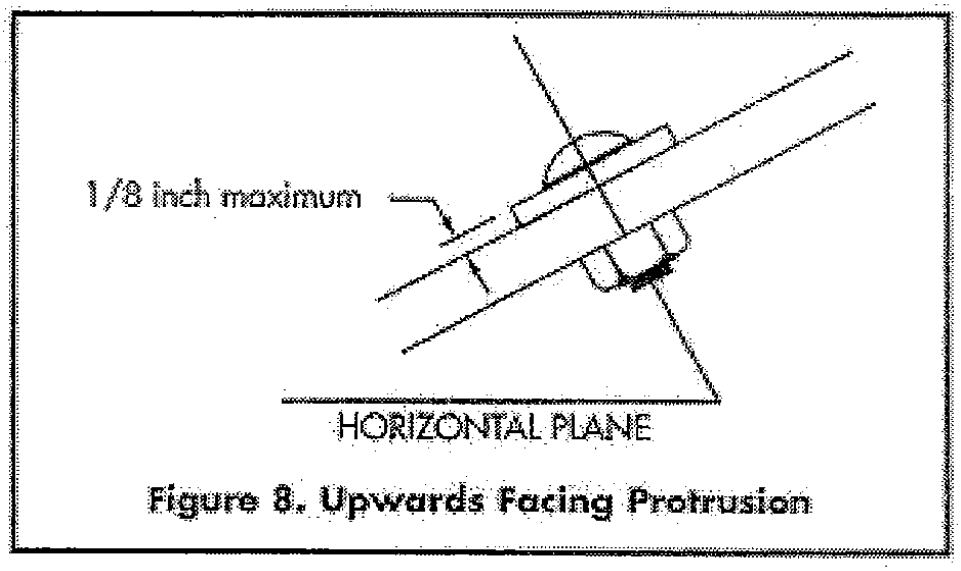


Figure 8. Upwards Facing Protrusion

Materials

General Requirements

Playground equipment shall be manufactured and constructed only of materials that have a demonstrated record of durability in the playground or similar outdoor setting.

Metals

Metals shall be painted, galvanized or otherwise treated to prevent rust.

Coatings

All paints or other similar finishes shall be non-toxic with documentation from the manufacturer stating that this treatment will not present a hazard to the user.

Wood
Wood shall be naturally rot and insect resistant or treated to avoid such deterioration. Creosote, pentachlorophenol and tributyl tin oxide are too toxic and shall not be used as preservatives for playground equipment. Technology exists that will minimize the amount of leachable chemicals on the surface of the wood after treatment. Consumers should request the information sheet available from the manufacturer of the preservative.

Plastics
Plastics shall be strong and durable and able to maintain structural integrity under a wide range of temperature variation.

Ropes
Ropes shall be strong and durable and resistant to U.V. deterioration.

Hazardous Substances
The manufacturer shall ensure that users of the playground equipment cannot ingest, inhale, or absorb any potentially hazardous amounts of substances as a result of contact with the equipment.

Fastening Devices
All fasteners shall be corrosion resistant. Bearings shall be easy to lubricate or be self lubricating. All hooks, including S-hooks,shall be closed as tightly as possible. **(See 12.3.5.1 and 12.3.5.2 in CAN/CSA-Z614-03)**

Fasteners

Corrosion Resistance
All fasteners and connecting and covering devices shall be inherently corrosion-resistant or be provided with a corrosion-resistant coating.

Security
When installed in accordance with the manufacturer's instructions, fasteners and connecting and covering devices shall not loosen or be removable without the use of tools. Lock washers, self-locking nuts, or other locking means shall be provided for all nuts and bolts to protect them from detachment. Hardware in moving joints shall also be secured against unintentional loosening.

Moving Suspended Elements

General
Moving suspended elements shall be connected to a fixed support using bearings that will reduce friction.

Steel Cable
Cables shall be protected to lessen the possibility of loosening or unravelling.

Chains
Chains shall comply with the requirements of **Clause 12.4.1 in CAN/CSA-Z614-03**

Tires
If steel belted radials are used, they shall be closely examined to ensure there are no exposed steel belts that could be a protrusion or laceration hazard. Water should not be allowed to accumulate in the tires and drainage holes should be considered.

Pinch, Crush and Shearing Points
There shall 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. When inspecting playground equipment, consider the likelihood of a body part being entrapped and the configuration and closing force of the components.

Requirements for Access/Egress

Access to playground equipment is varied and may be by means of ramps, steps, ladders, climbing nets, arch climbers and tire climbers. Stairways, ramps and ladders have a range of slopes permitted for these types of access. Table 2 in CAN/CSA-Z614-03 contains recommended dimensions for access slope, tread or rung width, tread depth, rung diameter and vertical rise. Openings between adjacent steps or rungs shall prevent the possibility of entrapment.

Handrails
Continuous handrails shall extend over the full length of the access and be provided on both sides of all stairways and stepladders. The appropriate measurements are provided in **Clause 13.1 in CAN/CSA-Z614-03**

Other Means of Access

Spiral stairways shall meet the requirements of Clause 13.1 and Table 2 in CAN/CSA-Z614-03 and Clause 13.2 provides additional information on this type of access Arch climbers and flexible components shall be used as a means of access only if another type of access is also provided. Flexible components shall be securely fastened at both ends and when one end is anchored to the ground, the anchors shall be below the protective surfacing.

Transition from Access to Platform

On stairways and stepladders, there shall be a continuation of handrails from the access to the platform.

On accesses that do not have side handrails, such as rung ladders, arch climbers, or flexible components, there shall be alternative hand-gripping support to facilitate the transition to the platform.

For rung ladders, flexible components, and arch climbers, the stepping surface used for final access shall not be above the designated play surface it serves.

Guardrails shall completely surround the elevated surface, except for entrance and exit openings necessary for each event. Means of ascent and descent, except at access points for stairs and ramps, that are accessible by openings in guardrails with horizontal dimensions greater than 375 mm (15 in) shall have a minimum of one top rail, i.e. maximum opening(s) without a top horizontal rail shall be 375 mm (15 in) in the horizontal dimension.

The top surface of guardrails shall have a height of 725 mm (29 in) or greater when the elevated surface is for use by children aged 18 months to 5 years old, and 950 mm (38 in) or greater when for use by children aged 5 to 12 years old.

The lower edge of guardrails on elevated surfaces intended for children aged 18 months to 5 years old shall be no greater than 575 mm (23 in) above the underlying equipment surface. For elevated surfaces intended for children aged 5 to 12 years old, the lower edge of the guardrails shall be no greater than 700 mm (28 in) above the underlying equipment surface.

Platforms

Guardrails or protective barriers shall be used to prevent falls off elevated platforms and shall be provided on platforms, walkways, landings and transitional surfaces. There shall be no designated play areas on guardrails and protective barriers and the design should minimize the possibility of climbing.

Children under five years of age require guardrails or protective barriers at lower levels and any elevated surface that is over 500 mm (20 in.) above the protective surfacing shall have this provided. A full protective barrier may be preferable for this age group as it affords a greater protection from falls.

Children older than five require guardrails or protective barriers on platforms higher than 750 mm (30 in.)

Protective barriers will always be provided when elevations exceed 750 mm (30 in.) for children under five years of age and 1200 mm(47 in.) for children over five. The protective barrier shall be complete around the elevated surface except for entrance and exit openings.

On some composite structures, there are layered or tiered platforms between the higher platform and the ground surface. The height difference between platforms shall be a maximum of 300 mm (12 in.) for children under five years of age and 450 mm (18 in.) for children older than five. Infill shall be used to reduce the space between platforms to prevent the possibility of entrapment.

Guardrails and Protective Barriers

Either guardrails or protective barriers may be used to prevent unintentional falls off elevated platforms. Protective barriers provide a greater degree of protection as they should prevent children climbing over or through the barrier.

Minimum Elevation Requiring Guardrails and Protective Barriers

Pre-School Age Children

An elevated surface that is more than 508 mm (20 inches) above the underlying surface should have a guardrail or protective barrier to prevent falls. Guardrails are acceptable for platforms greater than 508 mm (20 inches) and less than or equal to 762 mm (30 inches) high. A full protective barrier may be preferable here but a protective barrier is definitely required for platforms that exceed 762 mm (30 inches) in height.

School Age Children

An elevated surface that is more than 762 mm (30 inches) above the underlying surface should have a guardrail or protective barrier to prevent falls. For platforms greater than 762 mm (30 inches) and less than or equal to 1,219 mm (48 inches) high, guardrails are acceptable although a full protective barrier always provides greater protection. Platforms that exceed 1,219 mm (48 inches) in height shall always have a protective barrier.

Guardrails and Elevated Surfaces

Pre-School Age Children

The top surface of guardrails should be at least 736 mm (29 inches) high and the lower edge should be no more than 584 mm (23 inches) above the platform.

School Age Children
The top surface of guardrails should be at least 965 mm (38 inches) high and the lower edge should be no more than 660 mm (26 inches) above the platform.

Protective Barriers

Pre-School Age Children
The top surface of protective barriers should be at least 736 mm (29 inches) high.

School Age Children
The top surface or protective barriers should be at least 965 mm (38 inches) high.

Both guardrails and protective barriers should be designed to prevent unintentional falls off the platform, prevent the possibility of entrapment and facilitate supervision. Horizontal cross-pieces shall not be used as infill for the space below the top rail because they provide footholds for climbing.

Stepped Platforms

Some composite structures have layered or tiered platforms. Falls from a higher platform can be terminated by a lower platform rather than by the ground surface. Unless there is an alternate means of access/egress, the maximum difference in height between stepped platforms should be:

Pre-School Age Children: 305 mm (12 inches)

School Age Children: 457 mm (18 inches)

Playspace Layout

Each playstructure requires an area of protective surfacing that corresponds to the fall zone. The fall zone is the area under and adjacent to a playstructure where it is reasonable to expect that a child may land after a fall. The depth and other dimensions of the protective surfacing are dependent on the fall height. The fall height can be considered as an approximation of the maximum fall height from which a life threatening head injury would not be expected to occur. The surfacing material should have a depth that is relative to the height of the highest accessible part of the equipment.

No-Encroachment Zone

There shall be a no-encroachment zone surrounding the protective surfacing zone of moving equipment and in front of the protective surfacing zone of slides.

The no-encroachment zone shall extend at least 1800 mm (72 in) past the protective surfacing zone.

Each piece of playground equipment must have its own protective surfacing area and they shall not overlap. It is acceptable for adjacent pieces of playground equipment to share a single no-encroachment zone.

VISUALIZATION

Let's take a piece of equipment and decide how we can make it dangerous and even more dangerous. We will use slides for this purpose.

- Starting Platform
  - Height
  - slide sitting section/entrance

- Sliding Section Entrance
  - hand support
  - guardrail/hood $\Longrightarrow$ forces sitting
  - protective side enclosures

- Sliding Section
  - Height/length ratio shall not exceed 0.577
  - No slide span shall have a slope exceeding 50˚ from the horizontal
  - Sidewalks shall have a height of 100 mm (4 inches) or greater along both sides of the chute

- Exit Section
  - Slope of the exit section shall be between 0 and 4˚ from horizontal
  - Length of the exit section shall be a minimum of 275 mm (11 inches)
  - End of the slide shall be rounded to a minimum radius of 10 mm (0.375 inches) with no sharp edges

Figure 17

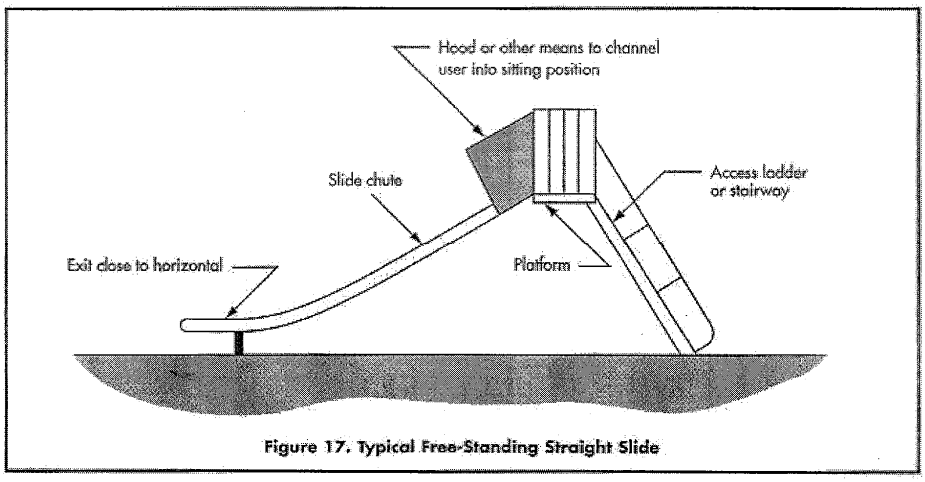


Figure 17. Typical Free-Standing Straight Slide

Figure 18

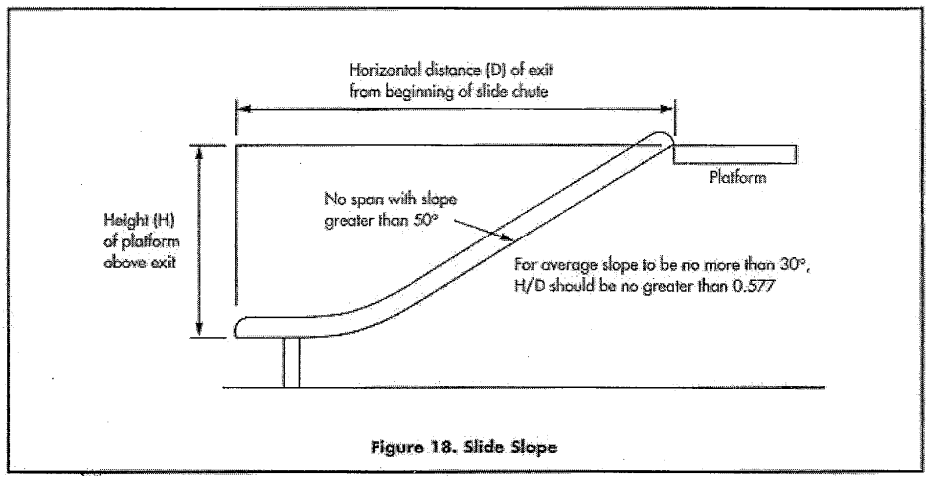


Figure 18. Slide Slope

Slides

Slide Access

With the exception of embankment slides, access to a slide may be by means of a ladder with rungs or steps, a stairway with steps, or the slide may be a component of a composite play structure to which access is provided by other means.

Slide Platform

All slides should be provided with a platform with sufficient length to facilitate the transition from standing to sitting at the top of the inclined sliding surface. The length of the platform will usually not be an issue when the slide is attached to the deck of a composite structure, because decks are generally at least 3 feet square. However, in the case of a free-standing slide, it is recommended that the platform have a minimum length of at least 22 inches.

The platform should be horizontal and have a width at least equal to the width of the slide. Guardrails or protective barriers should surround a slide platform. Slides should not have any spaces or gaps between the platform and the start of the slide chute. With the exception of tube slides, handholds should be provided at the entrance to all slides to facilitate the transition from standing to sitting and decrease the risk of falls.

At the entrance to the chute there should be a means to channel a user into a sitting position. This may be a guardrail, a hood, or other device. Whatever means is provided, it should be of a design that does not encourage climbing.

Sliding Section of Straight Slides

It is recommended that the average incline of a slide chute be no more than 30 degrees. This can be measured by determining that the height to length ratio (as shown in Figure 18) does not exceed 0.577. No span on the slide chute should have a slope greater than 50 degrees.

Straight slides with flat open chutes should have sides with a 4 inch minimum height extending along both sides of the chute for the entire length of the inclined sliding surface.

The sides should be an integral part of the chute, without any gaps between the sides and the sliding surface.

Metal slides should be placed in shaded areas to prevent burns caused by direct sun on the slide chute.

Exit region

All slides should have an exit region to help children maintain their balance and facilitate a smooth transition from sitting to standing when exiting.

The exit region should be essentially horizontal and parallel to the ground and have a minimum length of 11 inches.

Check CSA current standards for additional information on slides.

Hazard	*Actions Leading to Potential Accidents*
Steep angle	Dangerous speed of descent
No exit ramp	Fast speed to exit and possible falls
Hard ground	Hard landings
Open stairs	Entrapment, slippage
Rough surfaces	Scraped skin
No starting platform	No opportunity to begin a safe descent
Nearby equipment	Unsafe fall zone, potential collisions

Other hazards:	

What is an Accident?

- A happening that is not expected, foreseen or intended,
- An unpleasant and unintended happening sometimes resulting from negligence that results in injury, loss and/or damage.

What is the most common form of accident on playgrounds?

Falls

What part of the body is injured?

- Scrapes
- Broken bones & skull fractures
- Serious Injuries & Deaths

Hazard versus Danger

Danger

Situation that potentially exposes individual to harm, but is visible. E.g. Jump from a height.

Hazard

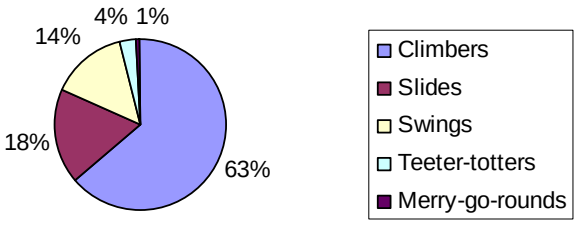
Situation where a danger is not readily apparent, such as entrapment hazards or a piece of playground equipment.

Where do Injuries Occur on Playgrounds?

In 1998, the Ontario School Boards issued a ten year study of incurred claims on playgrounds. These claims resulted from injuries sustained mainly from climbers, swings and slides with climbers alone involved in about 2/3 of all injuries.

The actual breakdown is as follows:

Climbers	63.6%
Slides	18.2%
Swings	14.2%
Teeter-totters	3.5%
Merry-go-rounds	0.5%



Further analysis of the climber injuries provided information that over 40% of the injuries could have been prevented or reduced if proper inspections and maintenance procedures were carried out.

Canadian Hospital Injury Reporting and Prevention Program (CHIRP) surveyed the results of hospital injuries involving children and found climbers, swings and slides were the pieces of playground equipment on which children are most frequently injured.

The results were:

- 38% injured on climbers
- 25% injured on swings
- 25% injured on slides
-

The actual injuries were:

- 78% as a result of a fall
- 15% by collision with another child or object
- 1.8% entrapment/entanglement

The 1.8% is a low value, but it must be kept in mind that this is the main cause of death.

Risk Management Strategies

Risk is a measurement of the likelihood of consequences and playgrounds certainly present some elements of risk. It is the purpose of risk management to moderate risk while leaving opportunities for play and growth.

Risk Avoidance

If the activity that may cause an injury does not take place, there is absolutely no chance of a loss resulting from that activity. This can be restated by saying "if there are no climbers on the playground, then it is impossible to have an injury or claim resulting from the use of a climber." Avoidance works best with high-risk activities, but this procedure is often not practical or acceptable for moderate risk playground equipment.

Risk Minimization

This strategy usually requires a great deal of effort which is on-going. Risk minimization often takes the form of loss prevention in that rules and procedures are established to minimize the risk of loss or to limit the severity of a loss.

An organization (school board, municipality, day care, etc.) accepts the benefits of the activity taking place exceeding the consequences of any injury that may result from the activity. An organization has accepted the risk of having a playground and uses risk management to take positive steps to reduce the chance of a loss occurring.

Occupier's Liability

Occupier's Duty

An occupier of premises owes a duty to persons entering on the premises and to any person, whether on or off the premises, whose property is on the premises, to take such care as, in all circumstances of the case, is reasonable to see that the person or property, as the case may be, will be reasonably safe while on the premises.

An occupier is a person or organization who has responsibility for and control over the condition of the premises or the activities that take place there. Premises shall be kept in proper repair and inspections conducted and kept on file. Courts will apply a standard to determine whether reasonable care has been taken by the occupier. In Canada, the Canadian Standards Association (CSA) manual on Children's Playspaces and Equipment will be applied as a test to determine whether reasonable care has been taken to provide for the safety of those using the playground equipment.

Public Playground Safety Checklist - Top Ten List

Is your public playground a safe place to play?

Each year, more than 200,000 children go to U.S. hospital emergency rooms with injuries associated with playground equipment. Most injuries occur when a child falls from the equipment onto the ground.

Use this simple checklist to help make sure your local community or school playground is a safe place to play.

Public Playground Safety Checklist

1. Make sure surfaces around playground equipment have at least 10 to 12 inches of wood chips, mulch, sand or pea gravel or have mats made of safety-tested rubber or rubber-like materials.

2. 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.

3. Make sure play structures more than 30 inches high are spaces at least 9 feet apart.

4. Check for dangerous hardware, like open “S” hooks or protruding bolt ends.

5. 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.

6. Check for sharp points or edges in equipment.

7. Look out for tripping hazards, like exposed concrete footings, tree stumps and rocks.

8. Make sure elevated surfaces, like platforms and ramps, have guardrails or protective barriers to prevent falls.

9. Check playgrounds regularly to see that equipment and surfacing are in good condition.

10. Where possible, adult supervision is highly recommended.

Sliding Poles

1. What is the distance from a platform to the top surface of a sliding pole?

2. What is the greatest diameter of the pole?

3. What is the maximum opening in a horizontal direction at a guardrail?

4. What is the fall height?

5. The clearance distances from structures to the pole is _____

15.4
Sliding Poles **(See Figure 31)**

15.4.1
Clearance distances from structures to the pole shall be between 450 mm (18 in) and 500 mm (20 in).

15.4.2
Upper access to the sliding pole shall be from one height only.

15.4.3
The distance from the platform's surface to the top surface of the sliding pole shall be a minimum of 1500 mm (60 in).

15.4.4
The pole shall be no greater than 50 mm (2 in) in diameter.

15.4.5
The sliding pole shall be continuous, with no protruding welds or joints along the sliding area, and shall have no abrupt changes in direction.

15.4.6
The guardrail or protective barrier at a platform entrance/exit opening shall have an opening with a maximum horizontal dimension of 375 mm (15 in).

15.4.7
Sliding poles are not recommended for children under 5 years of age.

15.4.8
The fall height is the height of the access platform, except where guardrails are present where the fall height is the top of the guardrail.

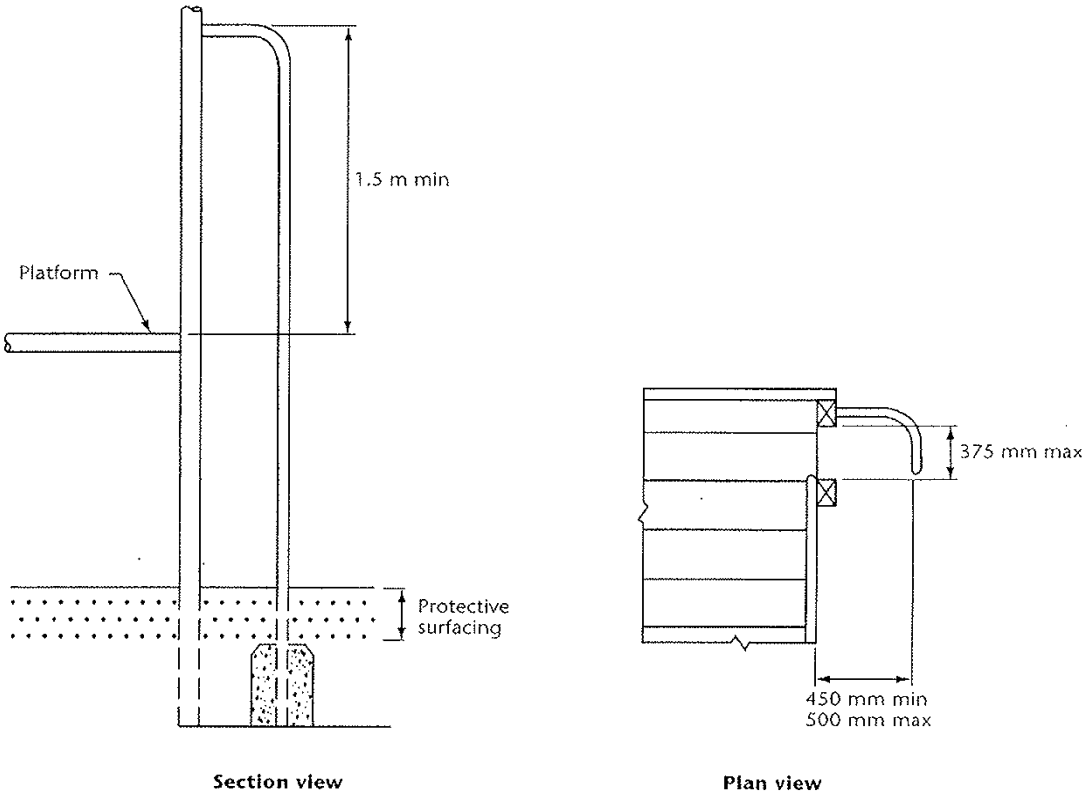


Figure 31
Details of a Sliding Pole
(See Clause 15.4.)

Surfacing

The surface under and around playground equipment can be a major factor in determining the injury-causing potential of a fall. A fall onto a shock absorbing surface is less likely to cause a serious injury than a fall onto a hard surface. The more shock absorbing a surface can be made, the more the likelihood that the severity of the injury will be reduced. **It must be recognized that all injuries due to falls cannot be prevented no matter what playground surfacing material is used.**

Critical Height

This term is used to describe the shock absorbing performance of a surfacing material. As it is used in this publication, the Critical Height for a surfacing material is defined as **the maximum height from which the instrumented metal headform, upon impact, yields both a peak deceleration of no more than 200 G's and a HIC of no more than 1,000 when tested in accordance with the procedure described in ASTM F1292.**

The most widely used test method for evaluating the shock absorbing properties of a playground surfacing material is to drop an instrumented metal headform onto a sample of the material and record the acceleration/time pulse during the impact. Such a method is described in an ASTM Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment, ASTM F1292.

The Critical Height of a surfacing material can be considered as an approximation of the fall height below which a life-threatening head injury would not be expected to occur. The surfacing material used under and around a particular piece of playground equipment should have a Critical Height value of at least the height of the highest designated play surface on the equipment. This height is the fall height for the equipment.

Highest Accessible Part of Equipment

Equipment	Highest Accessible Part
Swings	Height of the pivot point where the swing's suspending elements connect to the supporting structure
Elevated Platforms Including Slide Platforms	The fall height is the height of the platform. If the platform is surrounded by guardrails and children can climb onto or over guardrails, the height of the guardrail is included in the height above the playing surface.
Climbers and Horizontal Ladders	Maximum height of the structure

Merry-Go-Rounds	Height above the ground of any part of the perimeter on which a child may sit or stand.
See-Saws (Teeter totters)	Maximum height attainable by any part of the see-saw (teeter totter)
Spring Rockers	Maximum height above the ground of the seat or designated play surface

Material	Uncompressed depth						Compressed depth	
	150 mm	(6 in)	230 mm	(9 in)	300 mm	(12 in)	230 mm	(9 in)
	Critical Equipment Height		Critical Equipment Height		Critical Equipment Height		Critical Equipment Height	
	mm	(ft)	mm	(ft)	mm	(ft)	mm	(ft)
Wood Mulch	2100	(7)	3000	(10)	3300	(11)	3000	(10)
Double Shreedded Bark Mulch	1800	(6)	3000	(10)	3300	(11)	2100	(7)
Uniform Wood Chips	1800	(6)	2100	(7)	> 3600	(12)	1800	(6)
Fine Sand	1500	(5)	1500	(5)	2700	(9)	1500	(5)
Coarse Sand	1500	(5)	1500	(5)	1800	(6)	1200	(4)
Fine Gravel	1800	(6)	2100	(7)	3000	(10)	1800	(6)
Medium Gravel	1500	(5)	1500	(5)	1800	(6)	1500	(5)

Table 1
Critical Equipment Height according to Depth of Protective Material

CLIMBERS

Climbers refer to a wide variety of equipment including arch climbers, sliding poles, chain or net climbers, overhead horizontal ladders, overhead rings, dome climbers, parallel bars, balance beams, cable walks, suspension bridges and spiral climbers. Composite structures with linked platforms are also included. Climbing equipment is designed to present a greater degree of physical challenge than other equipment on public playgrounds.

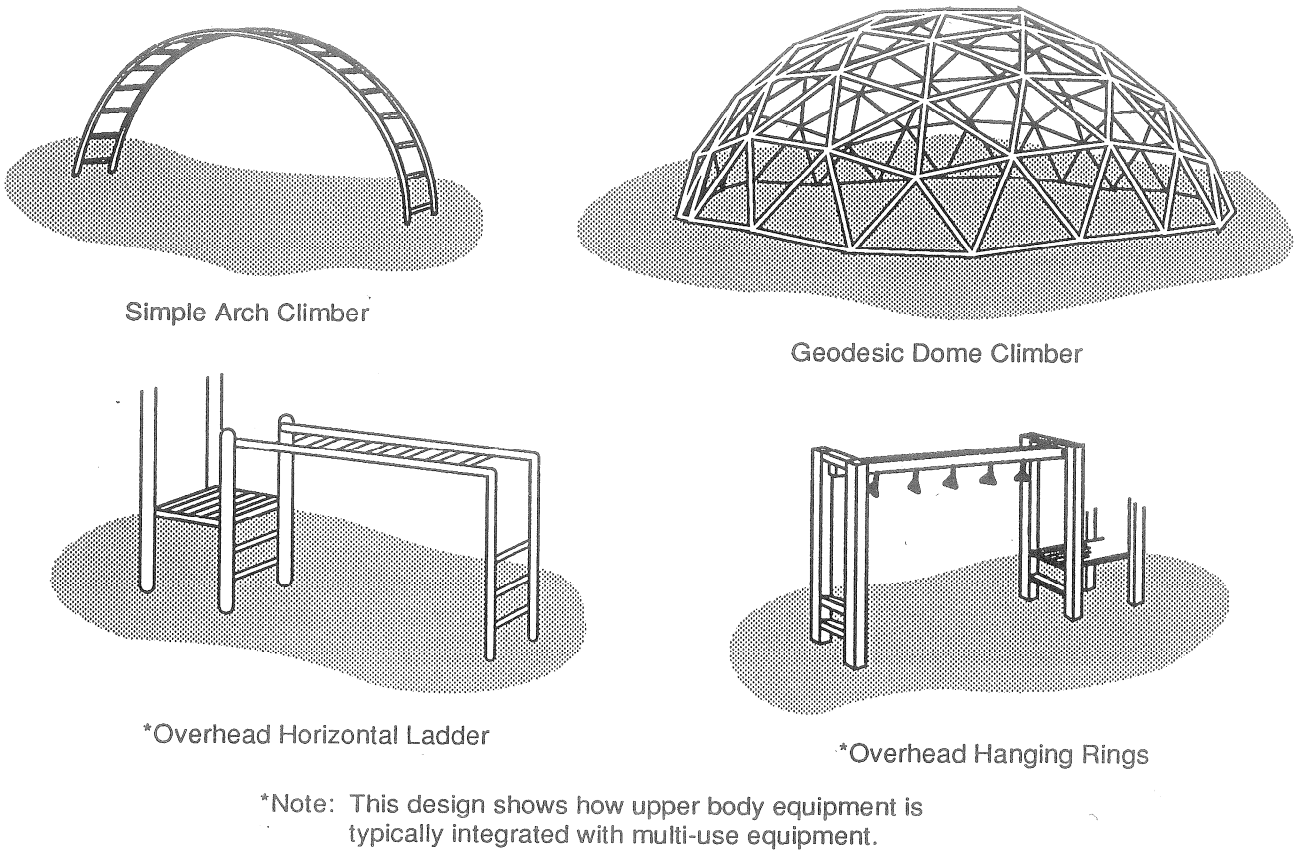


Figure 1 Typical Climbing Equipment

Climbers with Non-Rigid Components

Net and chain climbers use a flexible grid of ropes or chains for climbing. Tire climbers are also described as flexible climbers. These may have the tires secured tread-to-tread in the form of a sloping grid or the tires may be suspended individually by chains or other means to provide access to an elevated platform.

Flexible grid climbing devices which provide access to platforms should be securely anchored at both ends. When one end is connected to the ground, the anchoring devices shall be below the level of the playing surface.

Connections between ropes, cables, or chains within the climbing grid or between tires should be securely fixed. Spacing between the horizontal and vertical components of a climbing grid should satisfy all entrapment criteria.

Arch Climbers
Arch climbers consist of metal or wood rungs attached to convex side supports. They may be free standing or be provided as a more challenging means of access to other equipment.

Horizontal Ladders and Overhead Rings
Four year-olds are generally the youngest children capable of using upper body devices such as these. The recommendations below are, therefore, designed to accommodate children 4 through 12 years of age.

The space between adjacent rungs of overhead ladders should be greater than 9 inches to satisfy the entrapment requirements. The center-to-center spacing of horizontal ladder rungs should not exceed 15 inches. This does not apply to the spacing of overhead rings because, during use, the gripped ring swings through an arc and reduces the distance to the gripping surface of the next ring.

The first handhold on either end of upper body equipment should not be placed directly above the platform or climbing rung used for mount or dismount. This minimizes the risk of children impacting rigid access structures if they fall from the first handhold during mount or dismount.

Sliding Poles
Vertical sliding poles are designed to be more challenging than some other types of climbing equipment. They are not recommended for preschool-age children who may lack the requisite upper body strength and coordination to successfully slide down the pole. Furthermore, once younger children have grasped the pole, they would be forced to slide down it since there is no alternative option.

Sliding poles should be continuous with no protruding welds or seams along the sliding surface and the pole should not change direction along the sliding portion.

The horizontal distance between a sliding pole and the edge of the platform or other structure used for access to the sliding pole should be at least 18 inches. This minimum distance applies to all points down the sliding pole.

All points on the sliding pole at or above the level of the access structure, where a child is likely to reach for the pole, should not be more than 20 inches away from the edge of the access structure.

The pole should extend at least 38 inches above the level of the platform or other structure used for access to the sliding pole.

The diameter of sliding poles should be no greater than 1.9 inches.

The design of the access structure should minimize the possibility of interference from surrounding traffic that may be out of the line of sight of a user during descent.

Climbing Ropes

Individual vertically suspended climbing ropes are recommended only if they are securely fastened to a footing at the lower end to prevent the rope from being looped back on itself and forming a noose.

Balance Beams

To avoid groin injuries during falls, balance beams should be no higher than 12 inches.

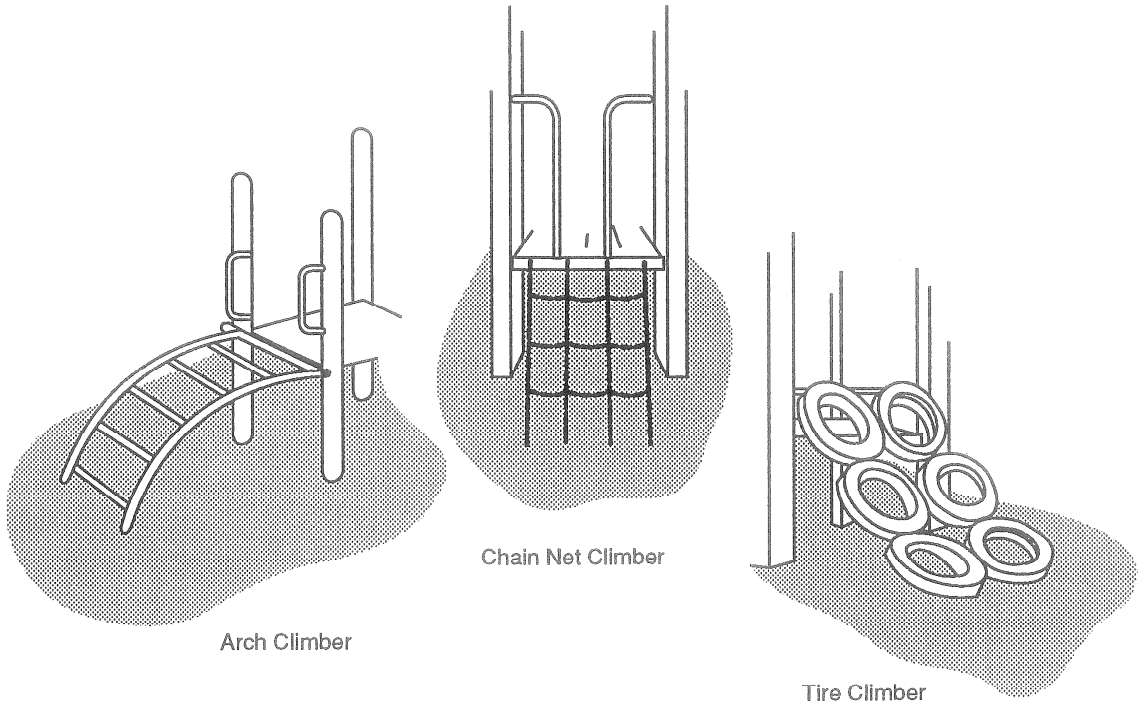
Layout of Climbing Components

When climbing components are part of a composite structure, their level of challenge and mode of use should be compatible with the traffic flow from adjacent components.

The swinging movements generated on upper body devices warrant special precautions to reduce the risk of impact with children on adjacent structures. Upper body devices should be placed so that swinging children cannot interfere with the movement of children on adjacent structures, particularly with their descent on slides.

The design of adjacent play structures should not facilitate climbing to the top support bars of upper body equipment.

Figure 2: Examples of More Challenging Modes of Access



SWINGS

Swings may be divided into two distinct types, single axis of motion and multiple axes of motion. A single axis swing is intended to swing back-and-forth in a single plane and generally consists of a seat supported by at least two suspending members each of which is connected to a separate pivot on an overhead structure. A multiple-axis swing consists of a seat (generally a tire) suspended from a single pivot that permits it to swing in any direction.

Hardware used to secure the suspending elements to the swing seat and to the supporting structure should not be removable without the use of tools. S-hooks are frequently used to attach the suspending elements to the overhead support bar or to the swing seat. Open S-hooks are hazardous because they can catch a child's clothing and result in strangulation. S-hooks should be pinched closed as tightly as possible.

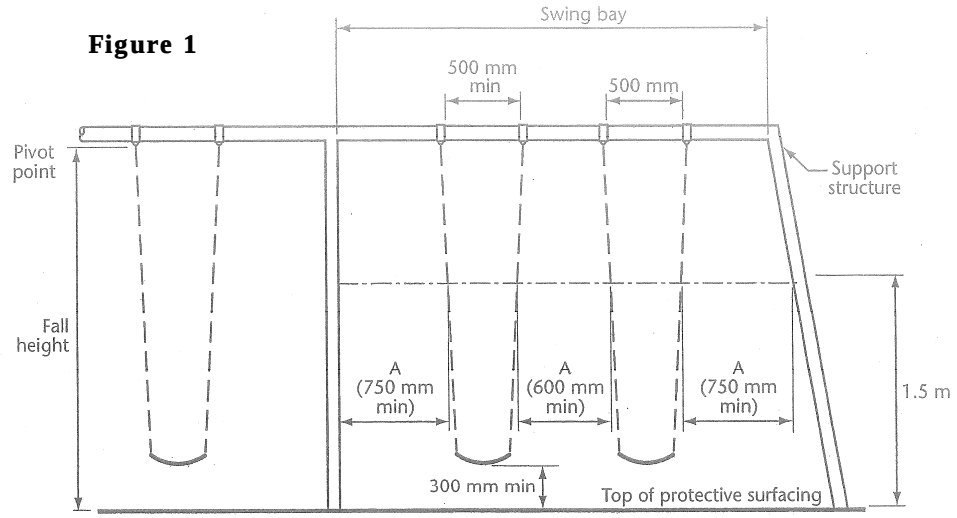
Swing support structures should discourage climbing and A-frame support structures shall not have horizontal cross-bars.

Swing seats shall be designed to accommodate one user at any time and wood or metal seats are NOT recommended.

To help prevent young children from running into the path of moving swings, swing structures shall be located away from other equipment or activities. To minimize the likelihood of children being struck by a moving swing, it is recommended that no more than two single axis swings be hung in each bay of the supporting structure.

To minimize collisions between swings or between a swing and the supporting structure, the clearances shown in Figure 1 are recommended. In order to reduce side-to-side
motion, swing hangers should be spaced wider than the width of the swing seat.

Figure 1



Note: *Dimension A shall be measured when the seat is occupied by the maximum user.*

Clearances

The horizontal distance between adjacent single axis swing seats at rest, when occupied by the maximum user, shall be no less than 600 mm when measured 1.5m above the protective surfacing.

The horizontal distance between the supporting structure and the adjacent single axis swing seat, when occupied by the maximum user, shall not be less than 750 mm when measured at 1.5 m above the protective surfacing.

The horizontal distance between the hangers supporting a single axis swing seat shall be greater than the width of the seat when occupied by the maximum user, and shall not be less than 500 mm.

The vertical distance between the underside of the occupied seat and the protective surfacing shall not be less than 300 mm.

15.6.2.5.1

The horizontal distance between adjacent to-fro swing seats at rest, when occupied by the maximum user, shall be no less than 600 mm when measured 1.5 m above the protective surfacing.

15.6.2.5.2

The horizontal distance between the supporting structure and the adjacent to-fro swing seat, when occupied by the maximum user, shall be not less than 750 mm when measured at 1.5 m above the protective surfacing.

15.6.2.5.3

The horizontal distance between the hangers supporting a to-fro swing seat shall be greater than the width of the seat when occupied by the maximum user, and shall not be less than 500 mm.

15.6.2.5.4

The vertical distance between the underside of the occupied seat and the protective surfacing shall not be less than 300 mm.

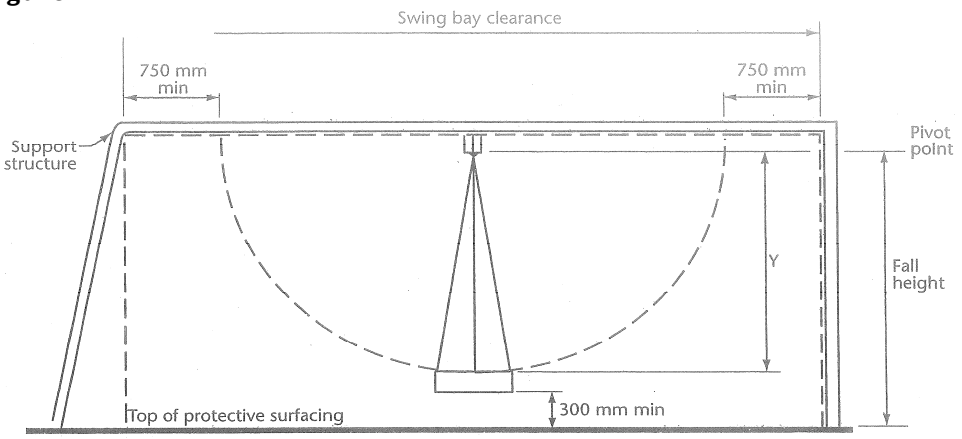
(Clauses 15.6.2.51. to 15.6.2.5.4 CAN/CSA-Z614-03)

Conversions
500 mm = 19.66 inches
600 mm = 23.52 inches
750 mm-= 29.40 inches
1.5 m = 59 inches

Multi-axis swings shall be located away from other play structures or activity areas.

The minimum clearance between the seating surface of a tire swing and the uprights of the supporting structure should be 750 mm (30 inches) when the tire is in a position closest to the support structure. The vertical distance between the underside of the rotating seat, when occupied by the design capacity of maximum users, and the protective surfacing shall not be less than 300 mm (12 inches).

Figure 2



Note: *Y = the vertical distance from the pivot point to the sitting surface of the seat.*

Tot Swings

These are single axis swings intended for very young children to use with adult assistance. The seats and suspension systems of these swings, including the related hardware, should follow all of the other criteria for conventional single axis swings. Tot swing seats shall provide support on all sides of a child and these supports must not present a strangulation hazard.

Multi-Axis Tire Swings

Tire swings are typically suspended in a horizontal orientation using three suspension chains or cables connected to a single swivel mechanism that permits both rotation and a swinging motion in any axis. Only one multi-axis swing shall be located in the same bay.

The likelihood of hanger mechanism failure is increased for tire swings, due to the added stress of rotational movement and multiple occupancy. Special attention to maintenance is warranted and the hanger mechanism should not have any accessible pinch points.