

TABLE 2

Recommended Dimensions for Access Slope, Tread or Rung Width, Tread Depth, Rung Diameter, and Vertical Rise for Rung Ladders, Stepladders, Stairways, and Ramps.

Type of Access	Age of Intended User	
	2-5 Years	5-12 Years
Rung Ladders		
Slope	75°-90°	75°-90°
Rung Width	≥ 12"	≥ 16"
Vertical rise (tread to tread)	≤ 12"***	≤ 12"***
Rung Diameter	<u>0.95"-1.55"</u>	<u>0.95"-1.55"</u>
Stepladders		
Slope	50°-75°	50°-75°
Tread Width - Single File	12"-21"	≥ 16"
- Two-Abreast	*	≥ <u>36"</u>
Tread Depth - Open Riser	≥ 7"	≥ 3"
- Closed Riser	≥ 7"	≥ 6"
Vertical Rise (tread to tread)	≤ 9"***	≤ 12"***
Stairways		
Slope	≤ 35°	≤ 35°
Tread Width - Single File	≥ 12"	≥ 16"
- Two-Abreast	≥ 30"	≥ <u>36"</u>
Tread Depth - Open Riser	≥ 7"	≥ 8"
- Closed Riser	≥ 7"	≥ 8"
Vertical Rise (tread to tread)	≤ 9"***	≤ 12"***
Ramps (not intended for access by the disabled)		
Slope (vertical:horizontal)	≤ 1:8	≤ 1:8
Width - Single File	≥ 12"	≥ 16"

* Not recommended for ~~preschoolers~~ preschool-age children

** Entrapment provisions apply

10.3 Handrails

Handrails on stairways and stepladders are intended to provide hand support and to steady the user. Continuous handrails extending over the full length of the access should be provided on both sides of all stairways and stepladders, regardless of the height of the access. Rung ladders do not require handrails since rungs or side supports provide hand support on these more steeply inclined accesses.

10.3.1 Handrail Height

Handrails should be available for use at the appropriate height, beginning with the first step. The vertical distance between the top front edge of a step (tread nosing) and the top surface of the handrail above it should be ~~no less than 22 and no more than 38 inches~~ as follows:

Preschool-Age Children: between 22 and 26 inches.

School-Age Children: between 22 and 38 inches.

10.3.2 Handrail Diameter

The diameter or maximum cross-sectional dimension of handrails should be between ± 0.95 and ~~1.67~~ 1.55 inches. To benefit the weakest child in each age group, a diameter of 1.25 inches is preferred.

10.4 Transition from Access to Platform

On any transition from an access mode to a platform, handrails or handholds should be adequate to provide support until the child has fully achieved the desired posture on the platform. Any opening between a handrail and an adjacent vertical structure (e.g., vertical support post for a platform or vertical slat of a protective barrier) should not pose an entrapment hazard (see Section 9.6).

On accesses that do not ~~typically~~ have ~~side~~ handrails, such as rung ladders, flexible climbers, arch climbers, and tire climbers, ~~special attention should be given to providing~~ hand support should provide for to facilitate the transition between the top of the access and the platform. Options include vertical handrails and loop handgrips ~~which may extending~~ over the top of the access.

11. PLATFORMS, GUARDRAILS AND PROTECTIVE BARRIERS

11.1 Design Considerations

Platforms should be within $\pm 2^\circ$ of a horizontal plane and openings should be provided to allow for drainage.

11.2 Guardrails and Protective Barriers

Either guardrails or protective barriers may be used to prevent inadvertent or unintentional falls off elevated platforms. Protective barriers, however, provide a greater degree of protection in that they should be designed to prevent intentional attempts by children seeking to defeat the barrier either by climbing over or through the barrier.

For example, guardrails may have ~~horizontal~~ vertical rails with openings that are greater than 9 inches. Such openings would not present an entrapment hazard but would not prevent a child from ~~deliberately attempting to climbing over or~~ through the openings. ~~On the other hand,~~ A protective barrier should be designed to ~~preclude~~ prevent passage of a child during both inadvertent ~~and~~ or intentional attempts to defeat the barrier. ~~Therefore,~~ Any openings between uprights or between the platform surface and lower edge of a protective barrier should ~~preclude~~ prevent passage of the small torso template (see Figure B-3 in Appendix B).

11.3 Minimum Elevation Requiring Guardrails and Protective Barriers

Guardrails or protective barriers should be provided on platforms, walkways, landings, and transitional surfaces in accordance with the following minimum elevation recommendations.

Preschool-Age Children: Since younger children have poorer coordination and balance and are more vulnerable to injury than school-age children, guardrails or protective barriers are warranted at lower elevations. An elevated surface that is more than 20 inches above the underlying surface should have a guardrail or protective barrier to prevent falls. Guardrails are acceptable for platforms ~~greater than~~ over 20 inches ~~and less than or equal to~~ but not over 30 inches high, but a full protective barrier may be preferable for this age group since it affords a greater degree of protection from falls. Protective barriers should always be used for platforms that ~~exceed~~ are over 30 inches ~~in height~~ high.

School-Age Children: An elevated surface that is more than 30 inches above the underlying surface should have a guardrail or protective barrier to prevent falls. For platforms ~~greater than~~ over 30 inches ~~and less than or equal to~~ but not over 48 inches high, guardrails are acceptable, although a full protective barrier always provides greater protection. Platforms that ~~exceed~~ are over 48 inches ~~in height~~ high should always have a protective barrier.

An elevated surface is exempt from these recommendations if a guardrail or protective barrier would interfere with the intended use of the equipment; this includes most climbing equipment, and platforms that are layered so that fall height does not exceed 20 inches on equipment intended for preschool-age children or 30 inches on equipment intended for school-age children.

11.4 Minimum Height of Guardrails

The minimum height should prevent the largest child from inadvertently falling over the guardrail. In addition, the guardrail should extend low enough to prevent the smallest child

from inadvertently stepping under it (see Figure 13). Infill may be used between the top and intermediate rails to minimize the likelihood of climbing. When solid panels are used as infill, it is recommended that there be some transparent areas to facilitate supervision and to permit viewing from the platform. To prevent head entrapment, guardrails should conform to the entrapment requirements recommendations in Section 9.6.

Preschool-Age Children: the top surface of guardrails should be at least 29 inches high and the lower edge should be no more than 23 inches above the platform.

School-Age Children: the top surface of guardrails should be at least 38 inches high and the lower edge should be no more than 26 inches above the platform.

11.5 Minimum Height of Protective Barriers

The minimum height should prevent the largest child from inadvertently falling over the protective barrier. In addition, because the protective barrier should not permit children to climb through or under it, openings in the barrier should preclude passage of the small torso template (see Section 9.6).

Preschool-Age Children: the top surface of protective barriers should be at least 29 inches high. Vertical infill for protective barriers may be preferable for younger children because the vertical components can be grasped at whatever height a child chooses as a handhold and they discourage climbing.

School-Age Children: the top surface of protective barriers should be at least 38 inches high.

11.6 Other Design Considerations for Guardrails and Protective Barriers

Guardrails or protective barriers should completely surround an elevated platform except for entrance and exit openings necessary to access a play event. Except for openings providing access to stairs, ramps and upper body equipment (e.g. horizontal ladders, overhead rings and track rides), the opening width providing access to other play events should not exceed 15 inches.

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

11.7 Stepped Platforms

On some composite structures, platforms are layered or tiered, so that 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:

Preschool-Age Children: 12 inches.

School-Age Children: 18 inches.

The space between the stepped platforms should follow the recommendations for entrapment in enclosed openings in Section 9.6. If the space exceeds 9 inches and the height of the lower platform exceeds 30 inches for preschool equipment or 48 inches for school-age equipment, infill should be used to reduce the space to less than 3.5 inches.

12. MAJOR TYPES OF PLAYGROUND EQUIPMENT

12.1 Climbing Equipment

12.1.1 General

Climbers refer to a wide variety of equipment, including arch climbers, sliding poles, chain or net climbers, upper body devices (overhead horizontal ladders, overhead rings), dome climbers, parallel bars, balance beams, cable walks, suspension bridges, and spiral climbers, as well as composite structures with linked platforms (see Figure 14 for examples). Climbing equipment is generally designed to present a greater degree of physical challenge than other equipment on public playgrounds.

Older children tend to use climbing equipment more frequently and proficiently than younger ones. Because very young children have not yet developed some of the physical skills necessary for certain climbing activities (including balance, coordination, and upper body strength), they may have difficulty using more challenging climbing components such as rung ladders, non-rigid climbers, arch climbers, and upper body devices.

12.1.2 Design Considerations

Since the more challenging modes of access discussed in Section 10 are also intended to be used as climbing devices, the recommendations for the size of handgripping components and stepped platforms covered in that section are applicable to climbing equipment.

~~Climbers should not have climbing bars or other structural components in the interior of the structure onto which a child may fall from a height of greater than 18 inches.~~

Climbing equipment should allow children to descend as easily as they ascend. One way of implementing this recommendation is to provide an easier, alternate means of descent, such as another mode of access, platform, or piece of equipment. For example, a stairway can be added to provide a less challenging mode of descent than a vertical rung ladder or flexible

climbing device. The levels of challenge that characterize different types of accesses are discussed in Section 10.

Preschool-Age Children: Offering an easy way out is particularly important on climbing devices intended for preschoolers, since their ability to descend climbing components emerges later than their ability to climb up the same components.

12.1.3 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. Since net, chain, and tire climbers have flexible components that do not provide a steady means of support, and therefore require more advanced balance abilities than conventional ladders, they require special consideration.

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~~ should 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 (see Section 9.6).

Flexible grid climbing devices are not recommended as the sole means of access to equipment intended for preschool-age children.

12.1.4 Arch Climbers

Arch climbers consist of metal or wood rungs attached to convex side supports. They may be free standing (see Figure 14) or be provided as a more challenging means of access to other equipment (see Figure 12). Because of this extra challenge, they should not be used as the sole means of access to other equipment. A less challenging option will ensure that children use the arch climber because they are willing to assume the challenge and not because they are forced to use it. Free standing arch climbers are not recommended for preschool-age children.

The rung diameter and spacing of rungs on arch climbers should follow the recommendations for rung ladders in Table 2.

12.1.5 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~~ recommendations (see Section 9.6). The center-to-center spacing of horizontal ladder rungs should ~~not exceed 15 inches~~ be as follows:

Preschool-Age Children: no more than 12 inches.

School-Age Children: no more than 15 inches.

~~This does~~ These recommendations do 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.

Horizontal ladders intended for pre-school age children should have rungs that are parallel to one another, evenly spaced and the length of the ladder should be no more than 8 feet.

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.

The maximum height of upper body equipment measured from the center of the grasping device to the protective surfacing should be:

Preschool-Age Children: 60 inches.

School-Age Children: 78 inches.

The use of rungs for take-off and landing is not recommended.

12.1.6 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~~ 60 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.

12.1.7 Climbing Ropes

~~Individual vertically suspended climbing ropes are recommended only if they are securely anchored to a footing at the lower end to prevent the rope from being looped back on itself and forming a noose.~~ Climbing ropes are not recommended because of the potential hazard of strangulation.

12.1.8 Balance Beams

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

12.1.9 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.

12.2 Merry-Go-Rounds

Merry-go-rounds are the most common type of rotating equipment found on public playgrounds. Children usually sit or stand on the platform while other children or adults push the merry-go-round to make it rotate. In addition, children often get on and off the merry-go-round while it is in motion.

Merry-go-rounds may present a physical hazard to preschool-age children who have little or no control over such products once they are in motion. Therefore, children in this age group should always be supervised when using merry-go-rounds. Following are recommendations for merry-go-rounds are not recommended unless the following are observed.

The rotating platform should be continuous and approximately circular. The difference between the minimum and maximum radii of a non-circular platform should not exceed 2.0 inches (see Figure 15). No components of the apparatus, including handgrips, should extend beyond the perimeter of the platform.

Children should be provided with a secure means of holding on. Where handgrips are provided, they should conform to the general ~~requirements~~ recommendations for handgripping components in Section 10.2.1.

There should not be any accessible shearing or crushing mechanisms in the undercarriage of the equipment. The rotating platform of a merry-go-round should not have any sharp edges. The surface of the platform should be continuous with no openings between the axis and the periphery that permit a rod having a diameter of 5/16 inch to penetrate completely through the surface.

A means should be provided to limit the peripheral speed of rotation to a maximum of 13 ft/sec.

Merry-go-round platforms should not be provided with an oscillatory motion.

12.3 Seesaws

The typical seesaw (also known as a "teeter totter") consists of a board or pole supported at the center by a fulcrum and having a seat at each end (see Figure 16). Seesaw use is quite complex because it requires two children to cooperate and combine their actions. Younger children do not generally have the skills required to effectively use fulcrum seesaws. Therefore, ~~they~~ seesaws are not recommended on public playgrounds for preschool-age children unless they are equipped with a spring centering device to prevent abrupt contact with the ground should one child elect to dismount.

There is a trend to replace fulcrum seesaws on public playgrounds with spring-loaded seesaws which have the advantage of not requiring two children to coordinate their actions in order to play safely (see discussion of Spring Rocking Equipment in Section 12.5).

The fulcrum of fulcrum seesaws should not present a pinch or crush hazard.

Partial car tires, or some other shock-absorbing material, should be embedded in the ground underneath the seats of fulcrum seesaws, or secured on the underside of the seats. This will help prevent limbs from being crushed between the seat and the ground, as well as cushion

the impact. Fulcrum see-saws may also be equipped with a spring centering mechanism to minimize the risk of injury due to impact with the ground.

Handholds should be provided at each seating position for gripping with both hands and should not turn when grasped. Handholds should not protrude beyond the sides of the seat. Footrests should not be provided on fulcrum see-saws unless they are equipped with a spring centering mechanism to minimize the likelihood of impact with the ground.

Fulcrum seesaws should be constructed so that the maximum attainable angle between a line connecting the seats and the horizontal is 25° and the maximum attainable seat height is 60 inches above the level of the protective surface.

12.4 Slides

12.4.1 General

Although children under 6 years of age may be more likely to play on slides, older children will still use slides depending on their availability relative to other types of equipment. Children can be expected to descend slide chutes in many different positions, rather than always sitting and facing forward as they slide. They will slide down facing backward, on their knees, lying on their backs, head first and will walk both up and down the chute. Younger children in particular often slide down on their stomachs, either head or feet first.

Slides may provide a straight, wavy, or spiral descent either by means of a tube or an open slide bed chute. They may be either free standing (see Figure 17), part of a composite structure, or built on the grade of a natural or man-made slope (embankment slide). The recommendations in this section do not apply to water slides or swimming pool slides.

12.4.2 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. Whatever means of access is provided to a slide, it should conform to the guidelines specified in the general discussion of access to all playground equipment (see Section 10).

12.4.3 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 and should conform to the guidelines specified in the general discussion of platforms (see Section 11).

Slides should not have any spaces or gaps between the platform and the start of the ~~sliding surface~~ 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. These should extend high enough to provide hand support for the largest child in a standing position, and low enough to provide hand support for the smallest child in a sitting position.

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.

12.4.4 Sliding Section of Straight Slides

It is recommended that the average incline of the ~~sliding surface~~ slide chute should not exceed 30° and any change in the its slope ~~of the slide chute~~ (wave slide) should not allow a child to lose contact with the ~~sliding surface~~ chute.

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. [Note: Roller slides are excluded from this recommendation.]

Slides may have an open chute with a circular, semicircular or curved cross section providing provided that: ~~the height of the sides, measured from the lowest point on the chute is no less than half the width of the slide.~~

a. the vertical height of the sides is no less than 4 inches when measured at right angles to a horizontal line that is 12 inches long when the slide is intended for pre-school age children and 16 inches long when the slide is intended for school age children (see Figure 18)

or

b. the vertical height of the sides is no less than 4 inches minus two times the width of the slide chute divided by the radius of the slide chute curvature (see Figure 19).

Metal slides should either be in shaded areas or face north to prevent burns and glare problems caused by direct sun on the slide chute.

12.4.5 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.

For slides that are no more than 4 feet in height, the height of the exit region should be no more than 11 inches from the protective surface.

For slides that are over four feet in height the exit region should be at least 7 inches but not more than 15 inches above the protective surface.

Slide exit edges should be rounded or curved, to prevent lacerations or other injuries which could result from impact with a sharp or straight edge.

All slide exits should be located in uncongested areas of the playground.

12.4.6 Embankment Slides

The design of embankment slides basically eliminates the hazard of falls from height. Embankment slides should follow all of the recommendations given for straight slides (where applicable). It is important that some means be provided at the slide chute entrance to minimize the likelihood that they these slides will be used by children riding on skates, skateboards or bicycles.

12.4.7 Spiral Slides

It is recommended that spiral slides follow the recommendations for straight slides (where applicable), with special attention given to design features which may present problems unique to spiral slides, such as lateral discharge of the user.

Preschool-Age Children: Because younger these children have less ability to maintain balance and postural control, only short spiral slides, one turn or less, are recommended for this age group.

12.4.8 Tube Slides

Tube slides should meet all the applicable ~~requirements~~ recommendations for other slides.

Barriers should be provided or surfaces treated to prevent sliding on the top (outside) of the tube.

The minimum internal diameter of the tube should be no less than 23 inches.

It should be noted that children using tube slides are not visible to a supervisor. Consideration should be given to extra supervision on playgrounds having tube slides.

12.4.9 Roller Slides

~~These are not recommended for public playgrounds unless frequent maintenance can be guaranteed.~~

Roller slides should meet applicable recommendations for slides in Section 12.4.

The space between adjacent rollers and between the ends of the rollers and the stationary structure should be less than 3/16 inch.

Frequent inspections are recommended to insure that there are no missing rollers or broken bearings.

12.5 Spring Rockers ~~Rocking Equipment~~

Preschool-age children ~~Younger children~~ enjoy the bouncing and rocking activities presented by this equipment, but older children may not find it challenging enough.

Examples of spring rockers are shown in Figure 20. Preschoolers are the primary users of such rocking equipment. Therefore, the recommendations in this section address only preschool-age children.

Seat design should ~~minimize the likelihood of~~ not allow the rocker ~~being~~ to be used by more than the intended number of users.

Each seating position should be equipped with handgrips and footrests. The diameter of handgrips should follow the ~~general~~ recommendations for handgripping components in Section 10.

The springs of rocking equipment should minimize the possibility of children pinching either their hands or their feet between coils or between the spring and a part of the rocker.

12.6 Swings

12.6.1 General

Children of all ages generally enjoy the sensations created while swinging. Most often, they sit on the swings, and it is common to see children jumping off swings. Younger children tend to also swing on their stomachs, and older children may stand on the seats.

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 often part of a swing's suspension system, either attaching 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.

Swings should be suspended from support structures that discourage climbing. A-frame support structures should not have horizontal cross-bars.

Ropes are not recommended as a means to suspend swings.

12.6.2 Single-Axis Swings

To help prevent young children from inadvertently running into the path of moving swings, swing structures should be located away from other equipment or activities. Additional protection can be provided by means of a low barrier, such as a fence or hedge. Such barriers should not be an obstacle within the use zone of a swing structure or hamper supervision by blocking visibility.

The fall zone to the front and rear of single-axis swings should never overlap the fall zone of another piece of equipment.

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.

Attaching single-axis swings to composite structures is not recommended.

Swing seats should be designed to accommodate no more than one user at any time. To help reduce the severity of impact injuries, wood or metal swing seats are not recommended. Rubber or plastic swing seats are preferred. Edges of seats should have smoothly finished or rounded edges and should conform to the protrusion recommendations in Section 9.3.

The vertical distance from the underside of an unoccupied swing seat to the protective surface should be no less than 12 inches for swings intended for preschool-age children and no less than 16 inches for swings intended for school-age children.

To minimize collisions between swings or between a swing and the supporting structure, the clearances shown in Figure 21 are recommended. In addition, to reduce side-to-side motion, swing hangers should be spaced ~~wider than the width of the swing seat~~ no less than 20 inches apart.

12.6.3 Tot Swings

These are single axis swings intended for ~~very young~~ children under 4 years of age 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.

Full-bucket tot swing seats ~~should~~ are recommended to provide support on all sides of a child (see Figure 22). It is important that such supports do not present a strangulation hazard. Openings in tot swing seats should conform to the entrapment criteria in Section 9.6. It is recommended that tot swings be suspended from structures which are separate from those for other swings, or at least suspended from a separate bay of the same structure.

The vertical distance from the underside of an unoccupied tot swing seat to the protective surface should be no less than 24 inches.

12.6.4 Multi-Axis Tire Swings

Tire swings are usually 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.

A multi-axis tire swing should not be suspended from a structure having other swings in the same bay. Attaching multi-axis swings to composite structures is not recommended.

To minimize the hazard of impact, heavy truck tires should be avoided. Further, if steel-belted radials are used, they should be closely examined to ensure that there are no exposed steel belts that could be a potential protrusion or laceration hazard. Plastic materials can be used as an alternative to simulate actual automobile tires. Drainage holes should be provided in the underside of the tire.

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. The hanger mechanisms for multi-axis tire swings should not have any accessible pinch points.

The minimum clearance between the seating surface of a tire swing and the uprights of the supporting structure should be 30 inches when the tire is in a position closest to the support structure (see Figure 23).

12.6.5 Swings Not Recommended for Public Playgrounds

The following types of swings are not recommended for use in public playgrounds:

Animal Figure Swings - These are not recommended because their rigid metal framework results in a high mass presenting a risk of impact injury.

Multiple Occupancy Swings - With the exception of tire swings, swings that are intended for more than one user are not recommended because their greater mass, as compared to single occupancy swings, presents a risk of impact injury.

Rope Swings - Free swinging ropes that may fray or otherwise form a loop are not recommended because they present a potential strangulation hazard.

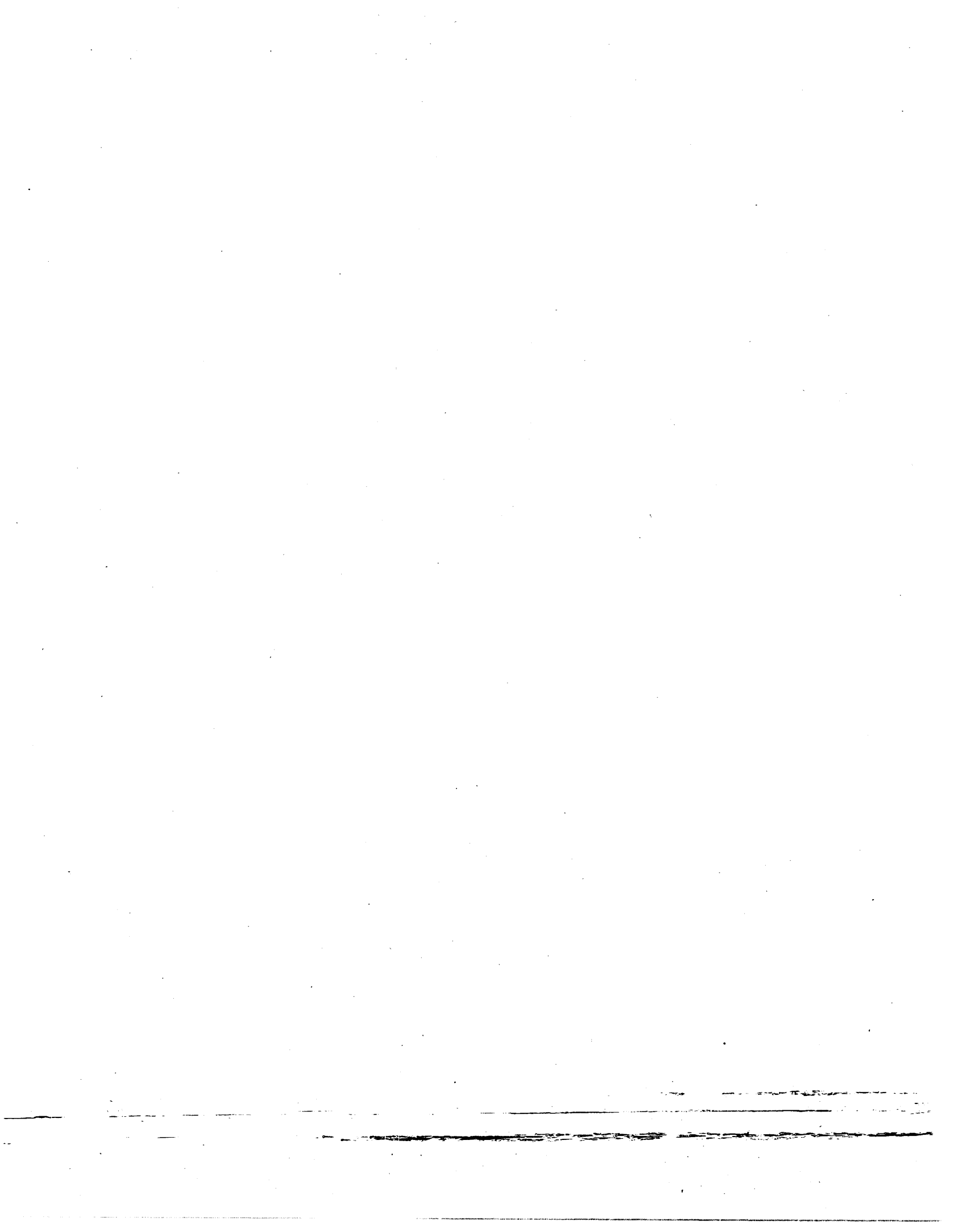
Swinging Dual Exercise Rings and Trapeze Bars - These are generally considered to be items of athletic equipment and are not recommended for public playgrounds. NOTE: The recommendation against the use of exercise rings does not apply to overhead hanging rings (see Figure 14).

12.7 Trampolines

Trampolines and similar gymnastic type equipment are not recommended for use on public playgrounds.

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8. Title 16, Code of Federal Regulations, Part 1303; *Ban of Lead-Containing Paint and Certain Consumer Products Bearing Lead-Containing Paint*; Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.
9. *CPSC Staff Recommendations for Identifying and Controlling Lead Paint on Public Playground Equipment*; U.S. Consumer Product Safety Commission, Washington, D.C., 20207, October 1996. Copies also available by calling 1-800-638-CPSC or visiting the CPSC's Internet Web site at <http://www.cpsc.gov> (go to "What's Happening").
10. Lee, Brian C., *Estimate of Risk of Skin Cancer from Dislodgeable Arsenic on Pressure Treated Wood Playground Equipment*; U.S. Consumer Product Safety Commission, Washington, D.C. 20207, January 1990.
11. *Consumer Information Sheet: Inorganic Arsenical Pressure-Treated Wood*; American Wood Preservers Institute, 1945 Gallows Road, Suite 550, Vienna, Virginia 22182.7.
12. National Recreation and Park Association, 2775 South Quincy Street, Suite 300, Arlington, VA 22206-2204.



APPENDIX A

SUGGESTED GENERAL MAINTENANCE CHECKLIST

The following checklist may be used to determine the condition of a playground. Numbers in parenthesis refer to sections in the handbook that discuss these issues. Place a check mark next to each of the following items that apply.

General Upkeep of Playgrounds (7.2)

- The entire playground is free from miscellaneous debris or litter such as tree branches, soda cans, bottles, glass, etc.
- There are no missing trash receptacles.
- Trash receptacles are not full.

Surfacing (4)

- The equipment has adequate protective surfacing under and around it and the surfacing materials have not deteriorated.
- Loose-fill surfacing materials have no foreign objects or debris.
- Loose-fill surfacing materials are not compacted and do not have reduced depth in heavy use areas such as under swings or at slide exits.

General Hazards

- There are no sharp points, corners or edges on the equipment (9.1).
- There are no missing or damaged protective caps or plugs (9.1).
- There are no hazardous protrusions and projections (9.2).
- There are no potential clothing entanglement hazards, such as open S-hooks or protruding bolts (8.2, and 9.4).
- There are no pinch, crush, and shearing points or exposed moving parts (9.5).
- There are no trip hazards, such as exposed footings on anchoring devices and rocks, roots, or any other environmental obstacles in the play area (9.7).

Deterioration of the Equipment (7.2)

- _____ The equipment has no rust, rot, cracks or splinters, especially where it comes in contact with the ground.
- _____ There are no broken or missing components on the equipment (e.g. handrails, guardrails, protective barriers, steps or rungs on ladders) and there are no damaged fences, benches, or signs on the playground.
- _____ All equipment is securely anchored.

Security of Hardware (7.2)

- _____ There are no loose fastening devices or worn connections such as S-hooks.
- _____ Moving components, such as swings hangers or merry-go-round bearings, are not worn.

Drainage (6.1)

- _____ The entire play area has satisfactory drainage, especially in heavy use areas such as under swings and at slide exits.

NOTES:

APPENDIX B

ENTRAPMENT REQUIREMENTS RECOMMENDATIONS AND TEST METHODS

B1. General - Any completely-bounded opening (see Figure B-1) may be a potential head entrapment hazard and should conform to the recommendations in this appendix. One exception to these recommendations is an opening where the ground serves as the lower boundary. Openings in both horizontal and vertical planes present a risk of entrapment. Even those openings which are low enough to permit a child's feet to touch the ground present a risk of strangulation to an entrapped child, because younger children may not have the necessary cognitive ability and motor skills to extricate their heads, especially if scared or panicked.

An opening may present an entrapment hazard if the distance between any interior opposing surfaces is greater than 3.5 inches or less than 9 inches; when one dimension of an opening is within this potentially hazardous range, all dimensions of the opening ~~must~~ should be considered together to fully evaluate the possibility of entrapment. The most appropriate method to determine whether an opening is hazardous is to test it using the following fixtures, methods, and performance criteria.

These recommendations apply to all playground equipment, both for preschool-age and school-age children; fixed equipment as well as moving equipment (in its stationary position) should be tested for entrapment hazards. There are two special cases for which separate procedures are given: completely-bounded openings where depth of penetration is a critical issue (see Figure B-2); and openings formed by non-rigid climbing components.

B2. Test Fixtures -- Two templates are required to determine if completely bounded openings in rigid structures present an entrapment hazard.

B2.1 Small Torso Template - The dimensions (see Figure B-3) of this template are based on the size of the torso of the smallest user at risk. If an opening is too small to admit the template, it is also too small to permit feet first entry by a child. Because children's heads are larger than their torsos, an opening that does not admit the small torso probe will also prevent head first entry into an opening by a child.

B2.2 Large Head Template - The dimensions (see Figure B-4) of this template are based on the largest dimension on the head of the largest child at risk. If an opening is large enough to permit free passage of the template, it is large enough to permit free passage of the head of the largest child at risk in any orientation. In addition, openings large enough to permit free passage of the Large Head Template also will not entrap the chest of the largest child at risk.

These templates can easily be fabricated from cardboard, plywood or sheet metal.

B3. Requirement Recommendation -- When tested in accordance with the procedure in B4. below, an opening ~~conforms to the requirement~~ meets the recommendation if:

- (1) the opening does not admit the Small Torso Template, or
- (2) the opening admits the Small Torso Template and also admits the Large Head Template.

An opening ~~fails to conform to the requirement~~ fails to meet the recommendation if it admits the Small Torso Template but does not admit the Large Head Template.

B4. Test Procedure -- Attempt to place the Small Torso Template in the opening with the plane of the template parallel to the plane of the opening. While keeping it parallel to the plane of the opening, the template should be rotated to its most adverse orientation i.e. major axis of template oriented parallel to the major axis of the opening. If the Small Torso Template can be freely inserted through the opening, place the Large Head Template in the opening, again with the plane of the template parallel to the plane of the opening, and attempt to freely insert it through the opening. The test procedure is illustrated in Figure B-5.

B5. Completely-Bounded Openings Where Depth of Penetration is a Critical Issue -- The configuration of some openings may be such that the depth of penetration is a critical issue for determining the entrapment potential. This is a special case for which separate test procedures are necessary.

For example, consider a vertical wall or some other barrier behind a stepladder. The entrapment potential depends not only on the dimensions of the opening between adjacent steps but also on the horizontal space between the lower boundary of the opening and the barrier. A child may enter the opening between adjacent steps feet first and may proceed to pass through the space between the rear of the lower step and the barrier and become entrapped when the child's head is unable to pass through either of these two openings. In effect, there are openings in two different planes each of which has the potential for head entrapment and ~~must~~ should, therefore, be tested.

Figure B-6 illustrates these two planes for a stepladder as well as for a generic opening. Plane A is the plane of the completely bounded opening in question and Plane B is the plane of the opening encompassing the horizontal space between the lower boundary of the opening in Plane A and the barrier that ~~must~~ should also be tested ~~for conformance to~~ against the entrapment requirements recommendations.

The procedures and performance criteria for testing openings where the depth of penetration is a critical issue depend on a series of questions, as described below.

The first step is to determine whether or not the smallest user at risk can enter the opening in Plane A. The Small Torso Template is used to test this opening as follows: