



Standard Consumer Safety Performance Specification for Playground Equipment for Public Use¹

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INTRODUCTION

This consumer safety performance specification establishes nationally recognized safety standards for public playground equipment to address injuries identified by the U.S. Consumer Product Safety Commission (CPSC).

During 1990 the CPSC estimated that about 150 000 victims were treated in U.S. hospital emergency rooms for injuries associated with public playground equipment. About three fourths of these injuries resulted from falls, primarily to the surface on which the equipment was located. Other hazard patterns involved impact by swings and other moving equipment and contact with protrusions, pinch points, and sharp edges. Fatalities reported to the CPSC resulted from falls; entanglement of clothing or similar items on equipment; entanglement in ropes tied to or caught on equipment; head entrapment; impact by equipment that tipped over or otherwise failed; and impact by moving swings. This consumer safety performance specification does not eliminate the need for supervision of children on public playground equipment. It is intended to minimize the likelihood of life-threatening or debilitating injuries, such as those identified by the CPSC.

1. Scope

1.1 This consumer safety performance specification provides safety and performance standards for various types of public playground equipment. Its purpose is to reduce life-threatening and debilitating injuries.

1.2 The range of users encompassed by this consumer safety performance specification is the 5th percentile 2-year-old to the 95th percentile 12 year-old.

1.3 Home playground equipment, amusement park equipment, sports equipment, fitness equipment intended for users over the age of 12, and soft contained play equipment are not included in this specification.

1.4 This consumer safety performance specification includes the following sections:

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1.5 The values stated in inch-pound units are to be

regarded as standard. The values given in parentheses are for information only.

NOTE 1—The conversion factor from inch-pound to metric units is 1 in. = 25.4 mm, and 1 lb = 0.45359 kg.

NOTE 2—See Annex A1 for figures referenced throughout this specification.

2. Referenced Documents

2.1 ASTM Standards:

- D 2240 Test Method for Rubber Property—Durometer Hardness²
- F 698 Specification for Physical Information to be Provided for Amusement Rides and Devices³
- F 846 Guide for Testing Performance of Amusement Rides and Devices³
- F 853 Practice for Maintenance Procedures for Amusement Rides and Devices³
- F 893 Guide for Inspection of Amusement Rides and Devices³
- F 1004 Consumer Safety Specification for Expansion Gates and Expandable Enclosures³
- F 1077 Guide for the Selection of Committee F-16 Fastener Specifications⁴
- F 1148 Consumer Safety Performance Specification for Home Playground Equipment³
- F 1159 Practice for the Design and Manufacture of Amusement Rides and Devices³
- F 1292 Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment³

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² Annual Book of ASTM Standards, Vol 09.01.

³ Annual Book of ASTM Standards, Vol 15.07.

⁴ Annual Book of ASTM Standards, Vol 15.08.

2.2 ANSI Standards:⁵

Z535.1 Safety Color Code

Z535.4 Products Safety—Signs and Labels

2.3 Federal Standards:⁶

16 CFR Part 1303 Ban of Lead-Containing Paint and Certain Consumer Products Bearing Lead-Containing Paint

16 CFR 1500 Hazardous Substances Act Regulations, including Sections:

1500.48 Technical Requirements for Determining a Sharp Point in Toys and Other Articles Intended for Use by Children Under 8 Years of Age

1500.49 Technical Requirements for Determining a Sharp Metal or Glass Edge in Toys and Other Articles Intended for Use by Children Under 8 Years of Age

16 CFR Section 1501 Method for Identifying Toys and Other Articles Intended for Use by Children Under 3 Years of Age Which Present Choking, Aspiration or Ingestion Hazards Because of Small Parts

Americans With Disabilities Act, Public Law 101-336:

28 CFR 35 Title II Subtitle A

28 CFR 36 Title III, Appendix A

2.5 Other Document:

UL 969 Standard for Safety: Marking and Labeling Systems⁷

3. Terminology

3.1 Descriptions of Terms Specific to This Standard:

3.1.1 *accessible*, *adj*—relating to a part or portion of the playground equipment, (1) capable of being contacted by any body part, or (2) accessible to and usable by persons with disabilities.

3.1.2 *accessible playground*, *n*—playground equipment area, that, when viewed in its entirety, may be approached, and entered and provides a range of play opportunities and experiences to users of varying abilities.

3.1.3 *accessible route*, *n*—to a piece of playground equipment, a continuous unobstructed pathway from the perimeter of the use zone to the equipment.

3.1.4 *adjacent decks*, *n*—two decks having a common vertical plane with some deviation in their height.

3.1.5 *completely bounded opening*, *n*—any opening in a piece of play equipment that is totally enclosed by boundaries on all sides so that the perimeter of the opening is continuous.

3.1.6 *component*, *n*—of a play structure, any portion thereof that generates specific activity and cannot stand alone.

3.1.7 *composite play structure*, *n*—two or more play structures attached or functionally linked, to create one integral unit that provides more than one play activity; an example is a combination climber, slide, and horizontal ladder.

3.1.8 *deck*, *n*—a platform on which the user can stand freely.

3.1.9 *designated play surface*, *n*—any elevated surface for standing, walking, sitting, or climbing, or a flat surface greater than 2 in. wide having less than 30° angle from horizontal.

3.1.10 *enclosed swing seat*, *n*—a suspended device upon which a user sits with non-removable supports on all sides of a user, which are intended to prevent a user from falling off the device while it is in motion.

3.1.11 *entanglement*, *n*—a condition in which the user's clothes or something around the user's neck becomes caught or entwined on a component of playground equipment.

3.1.12 *entrapment*, *n*—any condition which impedes withdrawal of a body or body part that has penetrated an opening.

3.1.13 *fall height*, *n*—the vertical distance between a designated play surface and the protective surfacing beneath it.

3.1.14 *flexible component*, *n*—any part of the playground equipment, excluding swings, that temporarily changes its shape when in use; examples include the tire net, the cargo net, and the log bridge.

3.1.15 *functionally linked play structure*, *n*—a play structure whose individual parts act as a single unit even if the parts are not physically attached.

3.1.16 *guardrail*, *n*—a device around an elevated surface that prevents inadvertent falls from the elevated surface.

3.1.17 *hand railing*, *n*—a rigid linear device, following the path of access or egress, that when grasped, provides balance and support in maintaining a specific body posture.

3.1.18 *maximum user*, *n*—a 12-year-old child; measurement characteristics are the 95th percentile values for combined sexes.

3.1.19 *minimum user*, *n*—a 2-year-old child; measurement characteristics are the 5th percentile values for combined sexes.

3.1.20 *partially bounded opening*, *n*—any opening in a piece of play equipment that is not totally enclosed by boundaries on all sides so that the perimeter of the opening is discontinuous.

3.1.21 *pinch, crush, and shear point*, *n*—the juncture at which the user could suffer contusion, laceration, abrasion, amputation, or fracture during use of the playground equipment.

3.1.22 *play structure*, *n*—a free standing structure with one or more components and their supporting members.

3.1.23 *preventive maintenance*, *n*—a planned program of inspections and maintenance intended to keep equipment functioning properly and to forestall equipment failures.

3.1.24 *professional judgment*, *n*—the ability of an individual with current knowledge, skill or experience, or both, in the field of playgrounds/playground equipment design, use, or operations, which enables the person to form an opinion or make a decision, or both, concerning a matter within that field of expertise.

3.1.25 *protective barrier*, *n*—an enclosing device around an elevated surface that prevents both inadvertent and deliberate attempts to pass through the device.

3.1.26 *protective surfacing*, *n*—material(s) to be used within the use zone of any playground equipment.

⁵ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

⁶ Code of Federal Regulations, available from U.S. Government Printing Office, Washington, DC 20402.

⁷ Available from Underwriters Laboratories, Inc., 333 Pfingsten Rd., Northbrook, IL 60062.

3.1.26.1 *Discussion*—Protective surfacing shall meet the minimum impact attenuation requirements of Specification F 1292.

3.1.27 *public use playground equipment, n*—a play structure with at least one designated play surface, anchored to the ground or not intended to be moved, for use in play areas of schools, parks, child-care facilities, institutions, multiple-family dwellings, private resorts and recreation developments, restaurants, and other areas of public use.

3.1.27.1 *Discussion*—Requirements for amusement park equipment, sports use, and home playground equipment are covered in Specifications F 698 and F 1148, Guides F 846 and F 893, and Practices F 853 and F 1159.

3.1.28 *rocking/springing equipment, n*—any play structure that rocks about a fixed base.

3.1.29 *rotating equipment, n*—any play structure that moves about a vertical or horizontal axis (for example, a merry-go-round, whirl, logroll, or spinner).

3.1.30 *rotating swing, n*—a play structure with at least one suspended seat designed for swinging by the user, in a seated position, in more than one plane and spins about its axis.

3.1.31 *rung, n*—a crosspiece in a ladder or other climbing equipment used for supporting the user's feet or for grasping by the user's hands, or both.

3.1.32 *sharp edge, n*—an edge that can cut a user's skin.

3.1.32.1 *Discussion*—An edge is judged as potentially sharp pursuant to the provisions of 16 CFR Section 1500.49.

3.1.33 *sharp point, n*—a point that can puncture or lacerate a user's skin during use.

3.1.33.1 *Discussion*—A point is judged as potentially sharp pursuant to the provisions of 16 CFR Section 1500.48.

3.1.34 *signal word, n*—the word that designates a degree or level of hazard.

3.1.34.1 *Discussion*—The signal word for safety labels is WARNING.

3.1.35 *small part, n*—an object that may become detached and presents a choking, aspiration, or ingestion hazard to the user.

3.1.35.1 *Discussion*—A small part is determined to be a hazard pursuant to the provision of 16 CFR Part 1501.

3.1.36 *stability, n*—the ability of the playground equipment to withstand anticipated forces which act to tip or slide the playground equipment when properly assembled and installed.

3.1.37 *stair, n*—a device having a slope of 50° or less from a horizontal plane and consisting of a series of steps that can be used for ascending and descending.

3.1.38 *stationary equipment, n*—any play structure which has a fixed base and does not move.

3.1.39 *step, n*—a horizontal flat crosspiece of a ladder or stair used primarily as a foot support.

3.1.39.1 *Discussion*—Also referred to as a *tread*.

3.1.40 *swing bay, n*—the space beneath the overhead beam bounded by one or more supports on which swing assembly or assemblies are attached.

3.1.41 *to-fro swing, n*—a play structure with at least one suspended component designed for swinging by the user in a single vertical plane, such as a seat, ring, bar, platform, or net.

3.1.42 *transfer point, n*—a platform or deck along an accessible route of travel or an accessible platform provided

to allow a child in a wheelchair to transfer from the chair onto the equipment.

3.1.43 *trip hazard, n*—an abrupt change in elevation that is not clear and obvious to the user.

3.1.44 *use zone, n*—the area beneath and immediately adjacent to a play structure or equipment that is designated for unrestricted circulation around the equipment and on whose surface it is predicted that a user would land when falling from or exiting the equipment.

3.1.44.1 *Discussion*—The surface area within the use zone shall meet the minimum impact attenuation requirements of Specification F 1292 from the maximum fall height.

3.1.45 *warning, n*—a notice or communication to indicate a potentially hazardous situation that if not avoided could result in death or serious injury.

4. Materials and Manufacture

4.1 *General Requirements*—Playground equipment shall be manufactured and constructed only of materials that have a demonstrated durability in the playground or similar outdoor setting. Any new materials shall be documented or tested accordingly for durability by the playground equipment manufacturer.

4.1.1 Metals subject to structural degradation such as rust or corrosion shall be painted, galvanized, or otherwise treated. Woods shall be naturally rot- and insect-resistant or treated to avoid such deterioration. Plastics and other materials that experience ultraviolet (UV) degradation shall be protected against ultraviolet light.

4.1.2 Regardless of the material or the treatment process, the manufacturer shall ensure that the users of the playground equipment cannot ingest, inhale, or absorb any potentially hazardous amounts of substances through body surfaces as a result of contact with the equipment. All paints or other similar finishes shall comply with 16 CFR Part 1303.

4.1.3 Wood intended for playground equipment that is not naturally rot- and insect-resistant shall be treated to resist rot and insect attack from standard procedures. Any wood not naturally rot- and insect-resistant, which has any fabrication up to 6 in. (150 mm) above, or any portion at or below the level of the protective surface of the playground, shall be treated after wood fabrication. Deviations shall have independent documentation of durability. Creosote, pentachlorophenol, tributyl tin oxide, and surface coatings that contain pesticides shall not be used for playground equipment. Wood treaters and playground equipment manufacturers shall practice technologies and procedures that minimize the level of dislodgeable toxin.

4.2 All fasteners used to construct public playground equipment shall be manufactured in accordance with Guide F 1077 and shall meet the requirements of Section 4.

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

4.2.2 When installed in accordance with the manufacturer's instructions, fasteners, 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.

4.2.3 Moving suspended elements shall be connected to the fixed support with bearings or bearing surfaces that serve to reduce friction or wear.

4.2.3.1 Steel cable that is permanently affixed to a hanger assembly performs as a bearing surface.

4.2.4 Hooks and connecting devices shall be subject to the requirements of 6.3.

5. General Requirements

5.1 Playground equipment represented as complying with this consumer safety performance specification shall meet all applicable requirements specified herein. Anyone representing compliance with this specification shall keep such essential records as are necessary to document any claim that the requirements within this specification have been met.

6. Performance Requirements

6.1 *Head and Neck Entrapment*—Public playground equipment shall be designed and constructed or assembled so that any accessible opening shall meet the following performance requirements to reduce the risk of accidental head or neck entrapment by either a head-first or feet-first entry into the opening. Openings between the protective surfacing and the bottom edge of the equipment (that is, rails, platforms, steps, and so forth) are exempt from this requirement as indicated by Fig. A1.1.

6.1.1 *Accessible Openings*—A completely bounded rigid opening is accessible when a torso test probe (see Fig. A1.2) can be inserted into the opening to a depth of 4 in. (100 mm) or more.

6.1.1.1 *Test Procedure for Completely Bounded Rigid Openings*—Place the torso probe (see Fig. A1.2) in the opening with the plane of the base of the probe parallel to the plane of the opening; rotate the probe to its most adverse orientation (that is, major axis of the base of the probe parallel to the major axis of opening). If the torso probe can be inserted into the opening to a depth of 4 in. (100 mm) or more, place the head probe (see Fig. A1.3) in the opening with the plane of the base of the probe parallel to the plane of the opening. An opening passes this test if (1) the opening does not admit the torso probe when it is rotated to any orientation about its own axis, or (2) the opening admits the torso probe and also admits the head probe. An opening fails the test if the opening admits the torso probe but does not admit the head probe.

6.1.1.2 Completely bounded openings that are accessible shall also meet the requirements for angles as outlined in 6.1.3.

6.1.2 *Nonrigid Completely Bounded Openings*—A nonrigid opening such as may be found in but not limited to flexible nets, tarps, and plastic enclosures is considered accessible if a torso probe will penetrate the opening to a depth of 4 in. (100 mm) or more when tested in accordance with the test procedure outlined in 6.1.2.1. (See Figs. A1.2 and A1.3 for probe dimensions.)

6.1.2.1 *Test Procedure for Completely Bounded Nonrigid Openings*—Place the torso probe in the opening, tapered-end first, with the plane of its base parallel to the plane of the opening; rotate the probe to its most adverse orientation (that is, the major axis of the base of the probe parallel to the major axis of the opening); apply a force of 50 lbf (222 N) to

the probe to attempt to pass it through the opening. If the base of the probe passes through the opening, place the large head probe in the opening, tapered end first, with the plane of its base parallel to the plane of the opening. Apply a force of 50 lbf (222 N) to the probe to attempt to pass it through the opening. A nonrigid opening passes the test if: (1) the opening does not allow the torso probe to be inserted so deep that the opening admits the base of the probe when it is rotated to any orientation about its own axis, or (2) the opening allows full passage of the torso probe and also allows the large head probe to pass completely through. A nonrigid opening fails the test if the opening allows full passage of the torso probe but does not admit the large head probe.

6.1.3 *Angular Portions of Openings*—Angles formed by the surfaces of an opening (that is, adjacent surfaces or surfaces that intersect when projected with a distance between surfaces of greater than 9 in. (228 mm) should be at least 55° unless one of the conditions defined in 6.1.3.1 exists.

6.1.3.1 *Exemptions to 6.1.3:*

(1) *Inverted Angle or V Condition*—Those V s which are inverted. A V is considered inverted if the lower adjacent leg forming the V is horizontal or slopes downward from the apex (see Fig. A1.4).

(2) *Filled Apex Condition*— V angles less than 55° where the apex of the angle is filled to the point that will not allow the head probe (see Fig. A1.3) to contact both surfaces of the angle simultaneously when the probe is rotated to any orientation about its own axis (see Fig. A1.4).

(3) Those partially bounded openings which are inverted. A partially bounded opening is considered inverted if the lowest interior boundary immediately adjacent to the opening is horizontal or slopes downward.

6.1.4 *Partially Bounded Openings:*

6.1.4.1 A partially bounded opening is considered accessible when any of the following conditions exist, and must meet the performance requirements as recommended in 6.1.4.2 and 6.1.4.3.

6.1.4.2 If the unbounded part of a partially bounded opening is between 1.875 in. (48 mm) and 9 in. (228 mm) in width when measured perpendicular to each surface, the opening can be considered accessible and must meet the conditions of 6.1.4.3.

6.1.4.3 *Test Method*—The “A” portion of the test template (Fig. A1.6a) is to be inserted along the centerline of the opening (determine the most adverse condition) (see Fig. A1.6b) so that the centerline of the template follows the centerline of the opening and the plane of the template is parallel to the plane of the opening until the motion is arrested by contact between the test template and the boundaries of the opening. By visual inspection, determine if there is simultaneous contact between the sides of the template. If simultaneous contact is made the opening is accessible and must be tested using the “B” portion of the test template (see Fig. A1.7).

6.1.4.4 If the angle test template “A” indicates failure, check for an exempted thick surface condition by positioning the plane of the “B” portion of the test template between and perpendicular to the plane of the boundaries of the opening (see Figs. A1.8 and A1.10). If the test template fits completely within the boundaries of the opening, the opening is considered hazardous and fails the test unless it allows full passage of the 9-in. (228 mm) head probe (see Fig. A1.9). If

the template does not fit down within the boundaries of the opening (defined as the opening outlined by the contact points of the test template "A") the opening is not considered accessible.

6.1.4.5 The test template is divided into two sections. Section "A" is used first to determine accessibility and is based on the Specification F 1004 standard rationale. Section "B" is used to determine if the thickness of the material or the location of the opening prevents access to the opening. The thickness of 0.75 in. (19 mm) for the template itself is based on half of the neck depth of a 5th percentile two year old minus compression. This dimension is consistent with Specification F 1004.

6.1.4.6 Other dimensions are based on the following:

- (1) 6.1 in. (155 mm) width represents 95th percentile 5 year old head width,
- (2) 1.875 in. (48 mm) is the neck breadth of the 5th percentile 2 year old (2.5 in. (64 mm) minus tissue compression),
- (3) 8.5 in. (216 mm) shoulder width of 5th percentile 2 year old,
- (4) 3 in. (76 mm) neck length of a five year old, and
- (5) The angle of the template sides is consistent with the 55° angle requirement.

6.1.4.7 *Exemption to 6.1.4*—Those partially bounded openings which are inverted. A partially bounded opening is considered inverted if the lowest interior boundary immediately adjacent to the opening is horizontal or slopes downward.

6.2 *Sharp Points, Edges, and Protrusions*—There shall be no accessible sharp edges or points. The exposed open ends of all tubing not resting on the ground, or otherwise covered, shall be provided with caps or plugs that cannot be removed without the use of tools. Any exposed bolt ends should not protrude beyond the face of the nut more than two threads after trimming and peening by the installer. A bolt end that protrudes beyond the face of the nut and is cut off to conform to the thread requirement shall be free of burrs and sharp edges. If smooth-finished caps are provided, the length of the protruding bolt end shall be such that the cap or covering fits flush against the nut or surrounding surface (see 16 CFR Section 1500.48, 16 CFR Section 1500.49, and 16 CFR Part 1501).

6.2.1 *Sharp Points and Edges*—Sharp points and edges shall be tested in accordance with the federal technical requirements referenced in 6.2. A minimum radius of curvature of 0.25 in. (6 mm) is recommended for corners and edges of suspended members. This section does not apply to belts, straps, ropes, and similar flexible components.

6.2.2 *Protrusions*—All protrusions, when tested in accordance with 6.2.2.1, shall not extend beyond the face of any of the three test gages having the dimensions shown in Fig. A1.11.

6.2.2.1 *Test Procedures for Determining a Protrusion Hazard*—Successively place each gage (see Fig. A1.12) over each protrusion to determine if the protrusion extends beyond the face of the gage. The protrusion fails the test if it protrudes beyond the face of the gage. A projection that does not fit within one of the three gages does not have to be tested. Protrusions should not increase in diameter from the surface to the exposed end. Protrusions that fit within any of

the three gages and that project upwards from a horizontal plane shall have no projection extending more than 0.125 in. (3 mm) perpendicular to the plane of the initial surface (see Figs. A1.13 and A1.13a).

6.2.3 *Exclusions to 6.2.2.1:*

6.2.3.1 *Inaccessible Protrusion*—A protrusion is inaccessible when it is recessed or located in such a manner that will not allow the protrusion gage to be placed over it.

6.2.3.2 Protrusions on the front and rear surfaces of suspended members of swing assemblies shall meet the requirements of 6.2.4.

6.2.4 Protrusions on the front and rear surfaces of suspended members of swing assemblies are subject to the following requirement: No surface in the potential impact region shall protrude through the hole beyond the face of the specified gage (see Fig. A1.14).

6.2.4.1 *Test Method*—Conduct the test with the suspended member in all positions of its intended travel. Place the gage shown in Fig. A1.14 over any protrusion that is accessible at any point throughout the path of travel. The gage is to be applied with its axis parallel to the direction of motion.

6.3 *Entanglement:*

6.3.1 Fastening devices such as but not limited to, S-hooks, pelican hooks, and C-hooks must be closed. A device is considered closed when there is no gap or space greater than 0.04 in. (1 mm) when measured with a feeler gage.

6.3.1.1 The configuration of the fastening device itself may create an entanglement hazard. The end of the wire of the lower loop of an S-hook-type fastener may not project beyond the vertical plane of the upper loop. When viewed from the side, the lower loop of an S-hook-type fastener may not extend beyond the vertical projection of the upper loop (see Fig. A1.15).

6.3.2 Slides including protective barriers and their method of attachment and transition areas pose a greater risk of entanglement than other areas of play equipment, therefore the following requirements apply to slides:

6.3.2.1 Any accessible protrusion that allows the 3.0 in. (76 mm) protrusion gage to pass over it shall have no projection extending perpendicular from the initial surface more than 0.125 in. (3 mm). The area that is subject to this requirement is outlined in Fig. A1.16.

6.3.2.2 Slides shall be constructed in such a manner as to provide a smooth continuous sliding surface, with no gaps or spaces that might create an entanglement hazard such as but not limited to the space created between sidewalls when two single slides are combined to create a doublewide slide or the point where a hood attaches to the sidewalls of a slide.

NOTE 3—Roller slides are exempt from 6.3.2.2.

6.4 *Pinch, Crush, and Shear Points*—There shall be no pinch, crush, or shear points caused by junctures of two components moving relative to one another, or at an opening present at the junction of a stationary support and a rigid supporting member for a swinging element (that is, pendulum see saw, glide rides, and so forth) while the swinging elements are within their normal swinging angles. A pinch, crush, or shear point is any point that entraps at one or more positions a 0.625 in. (16 mm) diameter rod.

6.4.1 To reduce the likelihood of unintentional contact

with a pinch, crush, or shear point, an opening shall comply with either 6.4.1.1 or 6.4.1.2.

6.4.1.1 An opening with a minor dimension of less than 1 in. (25 mm) is acceptable if a finger probe (as illustrated in Fig. A1.5), when inserted point first into an opening, cannot be made to touch any pinch, crush, or shear point. The probe shall be applied in all possible articulated positions with an application force not to exceed 1 lb (4 N).

6.4.1.2 An opening in an enclosure with a minor dimension of 1 in. (25 mm) or more, shall require that the pinch, crush, or shear point be located at a distance as specified in Table 1 from the plane of the opening.

NOTE 4—An enclosure in this case covers a pinch, crush, or shear point.

6.4.1.3 Exemptions to 6.4:

- (1) Chain and its method of attachment, and
- (2) The attachment area of heavy duty coil springs to the body and base of rocking equipment.

6.5 Suspended Hazards—There shall be no single non-rigid component (cable, wire, rope, or other similar component) suspended between play units or from the ground to the play unit within 45° of horizontal, unless it is above 84 in. (2100 mm) from the playground surface and is a minimum of 1 in. (25 mm) at its widest cross-section dimension. It is recommended that the suspended elements be either brightly colored or contrast with surrounding equipment to add to visibility.

6.5.1 Rope, cable, or chain shall be fixed at both ends and not be capable of being looped back on itself.

6.5.2 Exemptions for Suspended Components (Rigid or Flexible):

6.5.2.1 Multiple (two or more) suspended components (cables, wire, rope, or similar components) located at two or more elevations, may be suspended below 84 in. (2100 mm) when they comply with all other aspects of the single suspended component section and cannot be looped or stretched to contact another suspended component(s).

6.5.2.2 Chain or cable used to support a swing is exempt from this requirement. Rope shall not be used as a method of suspending swings.

7. Requirements for Access/Egress

7.1 Rung Ladders, Stepladders, Stairways, and Ramps (Does Not Address Wheelchair Use):

7.1.1 Steps and rungs shall be evenly spaced within a tolerance of ±0.25 in. (±6 mm) and horizontal within a tolerance of ±2°.

7.1.2 Steps and rungs shall not trap water (that is, no

standing water) and should not encourage the accumulation of debris.

7.1.3 See Table 2 for access slope; tread, rung, or ramp width; tread depth; ladder rung diameter; and vertical rise.

7.1.4 Handrails:

7.1.4.1 Continuous handrails shall be provided on both sides of stairways (see 7.2.1.3 for spiral stairways) and stepladders that have more than one tread.

7.1.4.2 Stairways or stepladders which consist of only one tread shall have handrails or alternate means of hand support on both sides.

7.1.4.3 Handrails or other means of hand support shall be available for use at the beginning of the first step.

7.1.4.4 Handrails shall be between 0.95 and 1.55 in. (24.1 and 39.4 mm) in diameter or maximum cross section.

7.1.4.5 Handrail height (the vertical distance between the top front edge of a step or, if used on a ramp, the top of the ramp surface, and the top surface of the handrail above it) shall be between 22 and 38 in. (560 and 970 mm).

7.2 Other Means of Access:

7.2.1 Spiral Stairways:

7.2.1.1 Spiral stairways shall meet the general requirements for spacing, orientation, drainage, tread width, and vertical rise specified for stairway access in 7.1.1 through 7.1.3.

7.2.1.2 The depth of the outer edge of the tread on spiral stairways shall be 7 in. (180 mm) or greater on equipment for children 2 through 5 years, and 8 in. (200 mm) or greater on equipment for children 5 through 12 years. These depth requirements apply to spiral stairways with both open and closed risers.

7.2.1.3 Spiral stairways shall meet the requirements specified for handrails in 7.1.4. However, when the design of the stairway does not permit handrails on both sides of the stairway, a continuous handrail shall be provided along the outside perimeter of the steps.

7.2.2 Flexible Access Devices:

7.2.2.1 Flexible climbing devices, such as net, chain, or tire climbers, shall not be used as the sole means of access to other components of equipment.

7.2.2.2 Flexible climbing devices used as access to other components of equipment shall be securely connected at both ends. When one end is connected to the ground, the anchoring devices shall be below the level of the playing surface.

7.2.2.3 Connections between ropes, cables, chains, or tires used as access to other components of equipment shall be securely fixed.

7.2.2.4 Flexible climbing devices used as access to other components of equipment for use by preschool children shall readily allow users to bring both feet to the same level before ascending to the next level.

7.2.2.5 Steel-belted tires shall not be used in tire climbers used for access.

7.2.2.6 Tire climbers used for access shall not trap water.

7.2.3 Arch Climber Accesses:

7.2.3.1 Arch climbers shall not be used as the sole means of access to other components of equipment.

7.2.3.2 Arch climbers used as access shall provide a means of hand support for use while climbing.

7.2.3.3 If rungs are used to provide hand support on arch

TABLE 1 Minimum Acceptable Distance from an Opening to a Pinch, Crush, or Shear Point

Minimum Dimension of Opening, ^a in. (mm) ^b	Minimum Distance from Opening to Part, in. (mm)
1 (25)	6.5 (165.0)
1.25 (32)	7.5 (190.0)
1.5 (38)	12.5 (320)
1.875 (48)	15.5 (395)
2.125 (54)	17.5 (445)
More than 2.125 (54) and less than 6 (150)	30 (760)

^a See 6.4.1.2.

^b Between 1 and 2.5-in. (25 and 64-mm) interpolation is used to determine values specified in the table.

TABLE 2 Rung Ladders, Stepladders, Stairways, and Ramps (Access Slope; Tread, Rung, and Ramp Width; Tread Depth; Rung Diameter; and Vertical Rise, by Age of Intended User)

Type of Access	Age of Intended User, years		
	2 through 5	5 through 12	2 through 12
Rung Ladders:^A			
Slope	75 to 90°	75 to 90°	75 to 90°
Total ladder width ^B	≥12 in. (300 mm)	≥16 in. (400 mm)	≥16 in. (400 mm)
Vertical rise (top of rung to top of rung)	≤12 in. ^C (300 mm)	≤12 in. ^C (300 mm)	≤12 in. ^C (300 mm)
Rung diameter	0.95 to 1.55 in. (24.1 to 39.4 mm)	0.95 to 1.55 in. (24.1 to 39.4 mm)	0.95 to 1.55 in. (24.1 to 39.4 mm)
Stepladders:			
Slope	50 to 75°	50 to 75°	50 to 75°
Tread width:			
Single file access	12 to 21 in. (300 to 530 mm)	≥16 in. (400 mm)	16 to 21 in. (400 to 530 mm)
Two-abreast access	^A	≥36 in. (910 mm)	^A
Tread depth:			
Open riser	≥7 in. (180 mm)	≥3 in. (76 mm)	≥7 in. (180 mm)
Closed riser	≥7 in. (180 mm)	≥6 in. (150 mm)	≥7 in. (180 mm)
Vertical rise (top of step to top of step)	≤9 in. ^C (228 mm)	≤12 in. ^C (300 mm)	≤9 in. ^C (228 mm)
Stairways:			
Slope	<50°	<50°	<50°
Tread width:			
Single file access	≥12 in. (300 mm)	≥16 in. (400 mm)	≥16 in. (400 mm)
Two-abreast access	≥30 in. (760 mm)	≥36 in. (910 mm)	≥36 in. (910 mm)
Tread depth:			
Open riser	≥7 in. (180 mm)	≥8 in. (200 mm)	≥8 in. (200 mm)
Closed riser	≥7 in. (180 mm)	≥8 in. (200 mm)	≥8 in. (200 mm)
Vertical rise (top of step to top of step)	≤9 in. ^C (228 mm)	≤12 in. ^C (300 mm)	≤9 in. ^C (228 mm)
Ramps (does not address wheelchair use):			
Slope (vertical/horizontal)	≤1:8	≤1:8	≤1:8
Width:			
Single file access	≥12 in. (300 mm)	≥16 in. (400 mm)	≥16 in. (400 mm)
Two-abreast access	≥30 in. (760 mm)	≥36 in. (910 mm)	≥36 in. (910 mm)

^A Not recommended as sole access for preschoolers.

^B Excluding side supports.

^C Entrapment provisions apply.

climbers used as access, the rungs shall be between 0.95 and 1.55 in. (24.1 and 39.4 mm) in diameter.

7.3 Transition from Access to Platform:

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

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

7.3.3 For rung ladders, flexible climbing devices, and arch climbers used as an access component, the stepping surface used for final access shall not be above the designated play surface it serves.

7.4 Platforms, Landings, Walkways, Ramps, and Similar Transitional Play Surfaces:

7.4.1 Platform surfaces shall be horizontal within a tolerance of ±2°.

7.4.2 Platforms, landings, walkways, ramps, and similar transitional play surfaces shall not trap water and should not encourage accumulation of debris.

7.4.3 Guardrails shall be provided on platforms, landings, walkways, ramps, and similar transitional play surfaces, in accordance with 7.4.3.1 through 7.4.3.4.

7.4.3.1 Guardrails or protective barriers (see 7.4.4) are required on elevated surfaces that are greater than 20 in. (510 mm) above the protective surfacing when intended for use by 2- through 5-year-olds, and on elevated surfaces greater than 30 in. (760 mm) above the protective surfacing when intended for use by 5- through 12-year-olds.

7.4.3.2 Guardrails shall completely surround the elevated

surface except for entrance and exit openings necessary for each event.

7.4.3.3 The top surface of guardrails shall have a height 29 in. (740 mm) or greater when the elevated surface is for use by 2 through 5-year-olds, and 38 in. (970 mm) or greater when for use by 5 through 12-year-olds.

7.4.3.4 The lower edge of guardrails on elevated surfaces intended for 2 through 5-year-olds shall be no greater than 23 in. (580 mm) above the underlying equipment surface. For elevated surfaces intended for 5 through 12-year-olds, the lower edge of the guardrails shall be no greater than 28 in. (710 mm) above the underlying equipment surface.

7.4.4 Protective barriers shall be provided on platforms, landings, walkways, ramps, and similar transitional play surfaces, in accordance with 7.4.4.1 through 7.4.4.5.

7.4.4.1 Protective barriers are required on elevated surfaces greater than 30 in. (760 mm) above the protective surfacing when intended for use by 2 through 5-year-olds, and greater than 48 in. (1.2 m) above the protective surfacing when intended for use by 5 through 12-year-olds.

7.4.4.2 Protective barriers shall completely surround the elevated surface except for entrance and exit openings necessary for each event.

7.4.4.3 The top surface of protective barriers shall have a height 29 in. (740 mm) or greater when the elevated surface is for use by 2 through 5-year-olds, and 38 in. (970 mm) or greater when intended for use by 5 through 12-year-olds.

7.4.4.4 Openings within barriers or between the platform surface and lower edge of protective barriers shall preclude passage of the torso probe (see 6.1.1).

TABLE 3 Measurements for Accessible Play Equipment

Element	Age of Intended User, years		
	2 through 12	2 through 5	5 through 12
Accessible route:			
Width	≥60 in. (1500 mm)	...	...
Maximum slope	≤1:20	...	...
Wheelchair ramp:			
Single chair width	≥36 in. (910 mm)	...	...
Single chair and ambulatory user	≥44 in. (1120 mm)	...	...
Double chair width	≥60 in. (1500 mm)	...	...
Slope	≤1:12	...	...
Length	≤144 in. (3660 mm)	...	...
Landing	≥60 in. (1500 mm)	...	...
Ramp height when barriers required	≥30 in. (760 mm)	≥30 in. (760 mm)	≥48 in. (1200 mm)
Single rail height	26 to 28 in. (660 to 710 mm)	...	...
Double rail height:			
Top rail	26 to 28 in. (660 to 710 mm)	26 to 28 in. (660 to 710 mm)	26 to 28 in. (660 to 710 mm)
Lower rail	12 to 16 in. (300 to 410 mm)	12 to 16 in. (300 to 410 mm)	12 to 16 in. (300 to 410 mm)
Curb height	≥2 in. (50 mm)	≥2 in. (50 mm)	≥2 in. (50 mm)
Transfer point:			
Height	14 to 18 in. (360 to 460 mm)	...	...
Width	≥24 in. (610 mm)	...	...
Depth	≥14 in. (360 mm)	...	...
Parking space	≥30 by 48 in. (760 by 1200 mm)	...	...
Accessible platform:			
Wheelchair	same as accessible	...	...
Passage width	ramp	...	...
Stepped platform height	≤8 in. (200 mm)	...	...
Platform step width	≥24 in. (610 mm)	...	...
Platform step depth	≥14 in. (360 mm)	...	...
Turning space	≥60 in. (1500 mm)	...	...
	≥36 in. "T" shaped turning space (see Fig. 32)	...	...
Accessible play opportunities:			
Tables:			
Leg height clearance	≥24 in. (610 mm)	...	...
Leg depth	≥17 in. (430 mm)	...	...
Use surface top	≤30 in. (760 mm)	...	...
Overhead reach	≤54 in. (1400 mm)	...	...
Side reach:			
Low	≥9 in. (228 mm)	...	...
High	≤48 in. (1200 mm)	...	...

7.4.4.5 Protective barriers shall minimize the likelihood of climbing.

7.4.5 Adjacent Decks:

7.4.5.1 Adjacent decks between which access is intended that have a height difference greater than 12 in. (300 mm) when intended for use by 2 through 5 year olds, and greater than 18 in. (460 mm) when intended for use by 5 through 12 year olds shall require an access component (see Fig. A1.17).

7.4.5.2 Access components between adjacent decks shall comply with the requirements of 7.3.

7.4.5.3 Guardrail and protective barriers on adjacent decks shall meet the requirements specified for other platforms in 7.4.3 and 7.4.4 except areas between platforms that do not permit the full barrier height. In these areas, protective infill shall be used (see Fig. A1.17).

8. Equipment

8.1 Balance Beams:

8.1.1 The top surface of balance beams shall be no greater than 12 in. (300 mm) above the protective surfacing when intended for use by 2 through 5-year-olds, and no greater than 16 in. (410 mm) above the protective surfacing when intended for use by 5 through 12-year-olds.

8.1.2 Support posts for balance beams shall not pose a tripping hazard.

8.2 Climbers:

8.2.1 Rungs that are used for hand support during ascent and descent of climbing apparatus shall be between 0.95 and 1.55 in. (24.1 and 39.4 mm) in diameter.

8.2.2 Flexible components (for example, nets, chains, tires, and so forth) of stand-alone climbing structures shall meet the same requirements as those specified in 7.2.2 for flexible climbing devices that provide access to or linkage between structures.

8.3 Upper Body Equipment (for example, horizontal ladders, chinning bars, and ring ladders):

8.3.1 Upper body equipment requiring the full support of the body weight is not recommended for users under five years of age.

8.3.2 The center-to-center distance between rungs on upper body equipment with fixed handholds shall be no greater than 15 in. (380 mm).

8.3.2.1 All handgrip devices on upper body equipment shall be between 0.95 in. (24.1 mm) and 1.55 in. (39.4 mm) in diameter.

8.3.3 The horizontal distance from the leading edge of the take-off or landing structure, or both, out to the first handhold of upper body equipment shall be no greater than 10 in. (250 mm). In addition, where access and egress are provided by means of rungs, the horizontal distance to the

first handhold shall be at least 8 in. (200 mm) but no greater than 10 in. (250 mm).

8.3.4 The maximum height of upper body devices for use by 2 through 5-year-olds shall be no greater than 60 in. (1.5 m), measured from the center of the grasping device to the top of the protective surfacing below. The maximum height of upper body devices for use by 5 through 12-year-olds shall be no greater than 84 in. (2.1 m).

8.3.5 The maximum height of the take-off/landing structure for upper body equipment shall be no greater than 18 in. (460 mm) above the protective surfacing on equipment for 2 through 5-year-olds, and no greater than 36 in. (910 mm) above the protective surfacing on equipment for 5 through 12-year-olds.

NOTE 5—Consider that the distance from the top of the take-off/landing structure to the first handhold should accommodate the vertical grip reach of the smallest user. The vertical grip reach of a 5th percentile 2-year-old is 39 in. (990 mm), and the vertical grip reach of a 5th percentile 5-year-old is 45 in. (1140 mm).

8.4 *Sliding Poles:*

8.4.1 Clearance distances from structures to the pole shall be between 18 in. (460 mm) and 20 in. (510 mm).

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

8.4.3 The sliding pole shall rise 38 in. (960 mm) or greater above the surface of the access structure.

8.4.4 The pole shall be no greater than 1.9 in. (48 mm) in diameter.

8.4.5 The sliding pole shall be continuous with no protruding welds or joints along the sliding area.

8.5 *Slides:*

8.5.1 Accesses to slides shall meet the same requirements as those for playground equipment in general, as specified in Section 7 (embankment slides excepted).

8.5.2 *Slide Transition Platforms:*

8.5.2.1 Slide transition platforms shall meet the same requirements for orientation, drainage, guardrails, and protective barriers specified for platforms on other playground equipment in 7.4.

8.5.2.2 The depth of the transition platform on slides shall be 22 in. (560 mm) or greater.

8.5.2.3 The transition platform shall have a width equal to or greater than the width of the sliding chute.

8.5.3 *Slide Chute Entrance:*

8.5.3.1 Handrails or other means of hand support shall be provided at the slide chute entrance to facilitate the transition from standing to sitting.

8.5.3.2 At the slide chute entrance, there shall be a means to channel the user into a sitting position (for example, guardrail, hood, and so forth).

8.5.4 *Slide Chute:*

8.5.4.1 The height/length ratio of the sliding surface shall not exceed 0.577, as measured in Fig. A1.18.

8.5.4.2 No span of the sliding surface shall have a slope that exceeds 50°.

8.5.4.3 The slide chute inside width shall be 12 in. (300 mm) or greater for 2 through 5-year-olds, or 16 in. (410 mm) or greater for 5 through 12-year-olds.

8.5.4.4 Slides with flat, open chutes shall have sidewalls with a height 4 in. (100 mm) or greater, that extended along

both sides of the chute for the entire length of the sliding surface.

8.5.4.5 Straight slides may have a chute with a circular, semicircular, or curved cross section, provided that: (1) the height of both sides are 4 in. (100 mm) (y) when measured at right angles above a horizontal line (x) that is 12 in. (300 mm) long when intended for 2 through 5-year-olds or 16 in. (400 mm) long when intended for 5 through 12-year-olds (see Fig. A1.19), or (2) the vertical sidewall height (H) of such slides are a minimum of 4 in. (100 mm) minus 2 times the width of the bedway (W) divided by the radius (R) of the bedway curvature, as follows (see Fig. A1.19a):

$$H \text{ (in.)} = 4 - \left(\frac{2W}{R} \right)$$

8.5.4.6 All slides with a curved cross section shall minimize the likelihood of lateral discharge (for example, spiral slides and other slides that change in horizontal direction; slides with a wide, shallow chute; and so forth).

8.5.4.7 The internal diameter of tube slides shall be 23 in. (580 mm) or greater.

8.5.5 *Exit Region:*

8.5.5.1 The slope of the exit region shall be between 0 and -4° as measured from a plane parallel to the underlying surface (see Fig. A1.21).

8.5.5.2 Slides shall have an exit region length of 11 in. (280 mm) or greater (see Fig. A1.21).

8.5.5.3 For slides with an elevation of no greater than 48 in. (1.2 m), the height of the exit region shall be no greater than 11 in. (280 mm) above the protective surfacing. For slides with an elevation greater than 48 in., the height of the exit region shall be between 7 and 15 in. (180 and 380 mm) above the protective surfacing (see Fig. A1.20).

8.5.5.4 The radius of curvature of the sliding surface in the exit region shall be 30 in. (760 mm) or greater (see Fig. A1.21).

8.5.5.5 Slide exit edges shall be rounded or curved.

8.5.6 *Slide Clearance Zones:*

8.5.6.1 A clear area, free of equipment, shall surround the slide chute. This area is defined by a height of 60 in. (1.5 m) as measured from the slide chute surface (portions of slides containing hoods or other devices to channel the user into a seated position, spiral slides, and tube slides excepted) and a width of 21 in. (530 mm) beyond the inside face of the sidewalls on each side (see Fig. A1.22). The clear area shall extend through the exit region.

8.5.6.2 Spiral slides shall maintain a clear area 21 in. (530 mm) wide, when measured from the inside face of the sidewall along the outer edge of the slide for the entire length of the slide.

8.6 *Swings:*

8.6.1 *To-Fro (Single Axis) Swings* (see Fig. A1.23):

8.6.1.1 *Placement:*

(1) To-fro swings shall be located away from other play structures and circulation areas. (Also see 9.4.1, layout of to-fro swings.)

(2) To-fro swings shall not be attached to a composite play structure.

8.6.1.2 *Support Structure*—The support structure shall be designed to discourage climbing and shall have no designated play surfaces.

8.6.1.3 *Seats:*

(1) No more than two to-fro swing seats shall be located within a swing bay. There shall be no limit on the number of bays provided in a single structure.

(2) To-fro swing seats shall accommodate no more than one user.

(3) To-fro swing seats shall be smoothly finished with blunt or rounded edges. Seats shall conform to 6.2.

(4) Hard or heavy seats such as those made of wood or metal are not recommended.

8.6.1.4 *Hangers*—Hangers shall have bearings, bushings, or other means of reducing the friction and wear of all moving parts and surfaces at the pivot point when moving in the intended direction of travel.

NOTE 6—A steel cable that is permanently affixed to a hanger assembly performs as a bearing surface.

8.6.1.5 *Clearances:*

(1) The horizontal distance between adjacent to-fro swings at rest, when occupied by the maximum user, shall be no less than 24 in. when measured 60 in. (1500 mm) above the protective surface (see Fig. A1.23).

(2) The horizontal distance between the supporting structure and the adjacent to-fro swing seat, when occupied by the maximum user, shall be no less than 30 in. (760 mm) when measured at 60 in. (1500 mm) above the protective surface.

(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 minimum user, but shall not be less than 20 in. (510 mm).

(4) The vertical distance between the underside of the occupied seat and the protective surface shall be no less than 12 in. (300 mm).

8.6.1.6 The fall height of to-fro swings shall be the vertical distance between the pivot point and the protective surface.

8.6.2 *Rotating (Multiple Axis) Swings* (See Fig. A1.24):

8.6.2.1 *Placement:*

(1) Rotating swings shall be located away from other play structures and circulation areas. (See also 9.4.2 on layout of rotating swings.)

(2) Rotating swings shall not be attached to a composite play structure.

8.6.2.2 *Support Structure:*

(1) The support structure of rotating swings shall be designed to discourage climbing and shall have no designated play surface.

(2) Only one suspended member/rotating swing seat shall be mounted within a swing bay. There shall be no limit on the number of bays provided in a single structure, however, swing bay clearances within a single structure (see 8.6.2.5 (1)) shall not overlap.

8.6.2.3 *Suspended Member/Rotating Swing Seat:*

(1) The weight of an unoccupied suspended member/rotating swing seat shall be not greater than 35 lb (15.8 kg).

(2) Steel-belted tires shall not be used as a rotating swing seat.

(3) Rotating swing seats may accommodate more than one user.

(4) Rotating swing seats shall be smoothly finished with blunt or rounded edges. Seats shall conform to 6.2.

(5) Hard or heavy seats such as those made of wood or metal are not recommended.

8.6.2.4 *Hangers*—Hangers shall have bearings, bushings, or other means of reducing the friction and wear of all moving parts and surfaces at the pivot point when moving in the intended direction of travel.

8.6.2.5 *Clearances:*

(1) *Swing Bay Clearance*—The unobstructed clearance required for the suspended members/rotating swing seat is a cylindrical unobstructed zone centered on the pivot point of the swing with a radius equal to $X + 30$ in. (760 mm) whose cylinder length is from the top of the protective surface to the pivot point of the swing with X as shown in Fig. A1.24.

(2) *Underseat Clearance*—The vertical distance between the underside of the rotating seat, when occupied by the design capacity of maximum users, and the protective surface of the use zone shall be not less than 12 in. (300 mm).

8.6.2.6 The fall height of rotating swings shall be the vertical distance between the pivot point and the protective surface of the use zone.

8.7 *Swinging Exercise Rings and Trapeze Bars:*

8.7.1 Swinging exercise rings, trapeze bars, and swinging gates and doors are not recommended for public playgrounds.

NOTE 7—The recommendation against the use of exercise rings does not apply to overhead hanging rings, such as those used in a ring trek or ring ladder. These components shall conform to 8.3 (see Fig. A1.45).

8.8 *Moving, Rotating, or Rocking Components:*

8.8.1 *Merry-Go-Rounds (Whirls):*

8.8.1.1 *Description*—Merry-go-rounds within the scope of this section generally have a circular platform close to the ground that rotates about a vertical axis.

8.8.1.2 *Platform Configuration*—The rotating platform shall be continuous and approximately circular. The difference between the minimum and maximum radii of a noncircular platform should not exceed 2 in. (50 mm) (see Fig. A1.19). No component of the apparatus, including handgrips, shall extend beyond the perimeter of the platform. The maximum height for the standing surface of the platform shall be 14 in. (360 mm) above the level of the protective surface.

8.8.1.3 *Handgrips*—Handgrips shall be provided to help children maintain their balance, or the platform in which the children sit shall be dish- or tub-like.

8.8.1.4 *Clearance Between Moving Parts:*

(1) *Pinch, Crush, and Shear Points*—The surface of the platform shall be continuous and any openings between the axis and the periphery must conform to the requirements for pinch, crush, and shear points, in 6.4.

(2) *Vertical Clearance*—The underside of the platform at the outer perimeter shall be no less than 9 in. (228 mm) above the level of the protective surface and shall conform to requirements for protrusions in 6.2 and pinch, crush, and shear points in 6.4. Platforms with a maximum diameter less than 20 in. (500 mm) are exempt from this requirement.

8.8.1.5 *Oscillation*—Merry-go-round platforms shall not be provided with an oscillatory (up and down) motion.

8.8.1.6 *Speed Limitations*—Merry-go-rounds shall be constructed to limit their maximum speed to the following formulas:

$$r/\text{min} = 76.632/\sqrt{D}$$

$$v = 4.012 \times \sqrt{D} \leq 13.0$$

where:

D = diameter, ft, and

v = peripheral velocity, ft/s.

NOTE 8—Merry-go-rounds with platform diameters less than 20 in. (500 mm) are exempt from the speed limitation requirement.

NOTE 9—The revolutions per minute formula is only to be used when $D \leq 10.5$.

8.9 Roller Slides:

8.9.1 Roller slides shall meet the specified requirements for slides in 7.7.

8.9.2 There shall be no pinch, crush, shear, entrapment, entanglement, or catch points between the junctures caused by two or more components.

8.9.2.1 A pinch, crush, shear, entrapment, or catch point is any point that will admit a $\frac{3}{16}$ -in. (5-mm) diameter neoprene rod at one or more positions, either between rollers or adjacent stationary segments.

8.9.3 The neoprene rods shall have a hardness reading between 50 and 60 as determined by a Type A durometer in accordance with Test Method D 2240.

8.10 Seesaws:

8.10.1 Fulcrum seesaws (also known as teeter totters) are not recommended for preschool age children unless they are equipped with a spring centering mechanism to minimize abrupt contact with the underlying protective surface should one child elect to dismount.

8.10.2 Shock-absorbing material, such as automobile tires, should be embedded in the underlying protective surface beneath the ends of fulcrum seesaws, or secured to the underside of each occupant position. As an alternative, seesaws may be equipped with a spring centering mechanism to minimize the risk of injury due to abrupt contact with the protective surface. Such a mechanism shall comply with the general requirements for pinch, crush, and shear points in 6.4.

8.10.3 The fulcrum of fulcrum seesaws shall comply with the general requirements for pinch, crush, and shear points in 6.4.

8.10.4 Each occupant position shall be provided with handgrip(s) that comply with the general requirements for protrusions (see 6.2).

8.10.4.1 Handgrip(s) shall not turn, rotate, or twist. Handgrip(s) intended to be gripped by one hand shall have a minimum length of 3 in. (76 mm). Handgrip(s) intended to be gripped by two hands shall have a minimum length of 6 in. (150 mm). Handgrip(s) shall not protrude beyond the sides of the seat on fulcrum seesaws.

8.10.5 Fulcrum seesaws shall not be equipped with footrests unless they have a spring centering mechanism to minimize the risk of injury due to abrupt contact with the underlying protective surface.

8.10.6 Seesaws shall 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 in. (1500 mm) above the level of the protective surface.

8.11 Spring Rocking Equipment:

8.11.1 Seats shall be designed to minimize the likelihood of use by more than the intended number of users.

8.11.2 Each seating position shall be provided with a handgrip(s) that comply with the general requirements for

protrusions (see 6.2) and for hand gripping components (see 7.1.4.4). Handgrips intended to be gripped by one hand shall have a minimum length of 3 in. (76 mm). Handgrips intended to be gripped by both hands shall have a minimum length of 6 in. (150 mm).

8.11.3 Footrests shall be provided that have a minimum width of 3.5 in. (89 mm) and shall conform to the general requirements for protrusions (see 6.2).

8.11.4 Spring mechanisms shall conform to the general requirements for pinch, crush, and shear points (see 6.4) when the equipment is operated by a maximum user (120 lb) (54 kg).

8.11.5 After installation, the height of the seat, while unloaded and at rest, shall not be less than 14 in. (360 mm) and not more than 28 in. (710 mm) above the protective surface.

8.12 Log Rolls:

8.12.1 Rigid handgripping component(s) shall be provided, and shall aid in mounting and dismounting the roll, and maintaining balance while in use.

8.12.2 Log rolls are not recommended for use by children 2 to 5 years.

8.12.3 The highest point of the top surface of the roller shall be no greater than 18 in. (460 mm) above the protective surfacing. Handgripping components shall be between 0.95 in. (24 mm) and 1.55 in. (39 mm) in diameter.

8.13 Track Rides:

8.13.1 The lowest portion of the hand gripping component shall be a minimum of 64 in. (1600 mm) above the protective surfacing. The maximum height of the hand gripping component shall not exceed 78 in. (1950 mm) above the protective surfacing.

8.13.2 The underside of the track beam shall be a minimum of 78 in. (1950 mm) above the protective surfacing. Tracks that conform to the requirements of 6.4 are exempt.

8.13.3 When the rolling portions of the hand gripping component are enclosed within the track beam, the track assembly is exempted from the pinch, crush, and shear requirements.

8.13.4 Any part, such as stabilizing rollers, of a handgripping component shall not be removable, with or without the use of tools, unless the hand-gripping component has been removed from the beam.

8.13.5 Track rides are not recommended for pre-school age children (2 to 5 years old).

9. Playground Layout

9.1 Play Structure Use Zone:

9.1.1 There shall be a use zone for each play structure which shall consist of obstacle-free surfacing that conforms to Specification F 1292 appropriate for the fall height of the equipment. The dimensions and configuration of the use zone shall be dependent upon the type of play equipment, as specified in 9.2 through 9.8.3.

9.2 *Stationary Play Equipment*—Stationary play equipment may be free-standing structures, may be in combination with other play equipment, or may be part(s) of a composite play structure (see Fig. A1.26).

9.2.1 The use zone for stationary play equipment shall extend no less than 72 in. (1800 mm) from all sides of the play structure.

9.2.2 The use zones for two or more stationary play structures that are not physically attached but are play-functionally linked shall be determined as if the separate equipment were parts of a composite play structure (see Fig. A1.33).

9.2.3 The use zones may overlap for two stationary play structures that are positioned adjacent to one another if the play components of each structure have adjacent designated play surface(s) 30 in. (760 mm) or less above the protective surfacing (see Fig. A1.26).

9.3 *Rotating Play Equipment* (see Fig. A1.27):

9.3.1 The use zone for equipment that rotates around a vertical axis shall be no less than 72 in. (1800 mm) from the perimeter of the play structure.

9.3.2 The use zone for equipment that rotates around a horizontal axis shall be no less than 72 in. (1800 mm) from the perimeter of the play structure.

9.3.3 No other play structure use zone shall overlap the use zone of rotating play equipment.

9.4 *Swings*:

9.4.1 *To-Fro Swings* (see Fig. A1.29):

9.4.1.1 The use zone to the front and to the rear of to-fro swings shall be a minimum distance of $2X$ on a line extending 90° both front and rear from the longitudinal direction of the suspending beam, where X equals the vertical distance from the top of the protective surfacing to the pivot point of the swing. The total horizontal distance from the front to the rear of the use zone shall be not less than $4X$.

9.4.1.2 For swings with enclosed swing seats or bucket seats, the use zone to the front and to the rear of the swing shall be a minimum distance of $2W$ on a line continuous both front and back 90° from the longitudinal direction of the suspending beam where W equals the vertical distance from the top of the occupant's sitting surface to the pivot point on the swing. The total horizontal distance from the front to the rear of the use zone should not be less than $4W$ (see Fig. A1.28).

NOTE 10—*Rationale*: Users cannot intentionally exit out of enclosed swing seats so the use zone may be less.

9.4.1.3 No other play structure use zone shall overlap the front-to-rear use zone of a to-fro swing.

9.4.1.4 The use zone width for to-fro swings shall be at least as wide as the span length of the suspending beam.

9.4.1.5 The use zone surrounding the support structure of to-fro swings shall extend no less than 72 in. (1800 mm) in all directions from the structure.

(J) The support structure use zones for adjacent to-fro swings may overlap (see Fig. A1.29).

9.4.2 *Rotating Swings* (see Fig. A1.30):

9.4.2.1 The use zone for a rotating swing shall be a minimum horizontal distance of $Y + 72$ in. (1800 mm) in all directions from pivot point of the swing, where Y equals the vertical distance between the pivot point and the top of the swing seat or suspended member.

9.4.2.2 No other play structure use zone shall overlap the use zone of a rotating swing.

9.4.2.3 The support structure use zones of separate adjacent rotating swings may overlap (see Fig. A1.30), however, use zones for the rotating swing seats $Y + 72$ in. (1800 mm) shall not overlap.

9.5 *Rocking/Springing Play Equipment* (see Fig. A1.31):

9.5.1 *Rocking/Springing Play Equipment Intended for Sitting*:

9.5.1.1 The use zone for rocking/springing equipment upon which the user is intended to sit shall be no less than 72 in. (1800 mm) in all directions from the at-rest perimeter of the play structure.

9.5.1.2 The use zones of adjacent rocking/springing equipment intended for sitting may overlap when each structure consists of a seat or designated play surface with a height 30 in. (760 mm) or less above the protective use zone surfacing when unoccupied.

9.5.2 *Rocking/Springing Play Equipment Intended for Standing* (see Fig. A1.31):

9.5.2.1 The use zone for rocking/springing equipment upon which the user is intended to stand shall be no less than 7 ft (2.1 m) in all directions from the at rest perimeter of the play structure.

9.5.2.2 No other play structure use zone shall overlap the use zone of a rocking/springing structure upon which the user is intended to stand.

9.6 *Slides* (see Fig. A1.32):

9.6.1 The use zone around the steps or ladder, platform, and chute or slide bed of straight, wavy, and spiral slides shall conform to the use zone standard for stationary play equipment.

9.6.2 The use zone at the lower exit end of the chute or slide bed shall be a minimum of $X + 48$ in. (1200 mm) where X equals the vertical distance from the protective use zone surfacing at the lower exit to the highest point of the sliding surface.

9.6.2.1 The use zone at the lower exit end of the chute or slide bed shall extend in the direction of the descent a horizontal distance not less than 72 in. (1800 mm) but need not be greater than 168 in. (4300 mm) from the lower exit.

9.6.2.2 The use zone at the lower exit end of the chute or slide bed is measured from the point on the chute or slide bed where the sliding surface transitionally changes to less than 5° from the horizontal. The use zone at the lower exit end of the chute or slide bed may be measured from the end of the chute or slide bed if the point where the sliding surface transitionally changes to less than 5° cannot be determined.

9.6.3 No other play structure use zone shall overlap the use zone of a slide.

9.7 *Composite Play Structures* (see Fig. A1.33):

9.7.1 The boundary of the use zone for a composite play structure shall be composed of those use zones that have been established for each individual play structure that, when joined together, comprise the composite play structure.

9.7.2 It is impractical to identify and establish assembled use zone standards for all possible configurations of a composite play structure. Therefore, the professional judgment of play equipment manufacturers, designers, and owner/operators shall be used when designing a modular composite play structure to eliminate hazards created by conflicts in circulation or use patterns, or both.

9.8 *Placement of Play Structures and Equipment* (see Fig. A1.34):

9.8.1 Sufficient space shall be provided between all adjacent structures and individual play equipment for the purposes of play and circulation.

9.8.2 In settings where periodic overcrowding is likely, a

supplemental circulation area beyond the use zone is recommended. Provision of such a supplemental circulation area shall be contingent upon the professional judgment of the playground designer or owner/operator.

9.8.3 Moving play equipment such as swings and rotating equipment shall be located in a position away from circulation routes and near the periphery of the playground.

10. Accessibility

10.1 *Accessible Route*—If the use zone of a playground is not entirely surfaced with an accessible material, at least one accessible route within the use zone shall be provided from the perimeter to all accessible play structures or components within the playground. For accessible play components, such as slides, where the access and egress points are not the same, an accessible route will be provided at both points. Accessible routes shall comply with the following:

10.1.1 The clear width of the accessible route shall be not less than 60 in. (1.5 m) in accordance with Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities, Section 4.2.2.

10.1.2 The accessible route within the use zone shall conform to the performance requirements of Specification F 1292 and Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities, Sections 4.5.1 and 4.5.2.

10.1.3 Any accessible route with a slope greater than 1:20 is a ramp and shall comply with the provisions of 10.2.1. Cross-slopes on accessible routes shall not exceed 1:50 in accordance with Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities, Section 4.3.7.

10.1.4 The accessible route within the use zone shall be designed to minimize the possibility of creating a trip hazard and causing a wheelchair to tip over the side edge of the route.

10.2 *Getting Users Onto Accessible Playground Equipment* (see Fig. A1.35):

10.2.1 A ramp, deck, or other stationary bridge, when used to connect an elevated access from the perimeter of the playground to the play equipment, shall be exempt from the use zone fall requirements where the connection is made at the perimeter.

10.2.2 *Ramps Intended for Wheelchair Use*—All ramps within the use zone that are intended for access to equipment such as decks and platforms shall conform to the following specifications. In addition, consideration should be given to provide other means of access to the equipment to enhance circulation and the opportunity to engage in play events (see Fig. A1.35). Ramps outside the use zone are beyond the scope of this specification and are subject to applicable federal or state accessibility standards.

10.2.2.1 The clear width of a ramp shall be not less than 36 in. (915 mm) in accordance with Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities, Section 4.8.3.

10.2.2.2 The slope of a ramp shall not be greater than 1:12 in accordance with Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities, Section 4.8.2.

10.2.2.3 The horizontal run of a ramp shall not be greater than 12 ft (3.7 m).

10.2.2.4 *Landings*:

(1) Ramps shall have a level landing with a diameter not less than 60 in. (1525 mm) at the bottom and top of each run.

(2) Landings that contain play components shall include a space where a wheelchair user may park and play that has dimensions of not less than 30 in. (760 mm) by 48 in. (1220 mm) and does not reduce the adjacent circulation path to less than 36 in. (915 mm).

(3) Ramp landings shall have guardrails or barriers in accordance with those required for wheelchair-accessible platforms. Openings for play events may be placed on ramp landings, however, professional judgment shall be used in the design and placement of these openings and provide a means to prevent wheelchairs from falling off of landings in accordance with the Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities, Section 4.8.7.

10.2.2.5 Ramps greater than 30 in. (760 mm) above the protective surface of the use zone, when designed for use by 2- to 5-year-olds, or greater than 48 in. (1220 mm) above the protective surface of the use zone, when designed for use by 5- to 12-year-olds, shall have barriers that conform to 7.4.4. Ramp height shall be measured at the highest point.

10.2.2.6 Ramps greater than 30 in. (760 mm) above the protective surface of the use zone, when designed for use by 2 to 5-year-olds, or greater than 48 in. (1220 mm) above the protective surface of the use zone, when designed for use by 5 to 12-year-olds, shall have a handrail on each side of the ramp 26 to 28 in. (660 to 710 mm) high in accordance with Recommendations for Accessibility to Serve Physically Handicapped Children in Elementary Schools, Section 4.8.5.

10.2.2.7 Ramps less than or equal to 30 in. (760 mm) above the protective surface of the use zone, when designed for use by 2- to 5-year-olds, or less than or equal to 48 in. (1220 mm), when designed for use by 5- to 12-year-olds, shall have two handrails on each side of the ramp that are 26 to 28 in. (660 to 710 mm) and 12 to 16 in. (305 to 410 mm) high and conform to 7.4.3. Ramp height shall be measured at the highest point.

10.2.2.8 Ramps where the barrier does not extend to within 1 in. (25 mm) of the ramp surface, ramps with 2 rails and no barrier, or ramps where the barrier is beyond the edge of the ramp must have a curb on both edges that projects above the ramp a minimum of 2 in. (50 mm) in accordance with Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities, Section 4.8.7.

10.2.3 *Transfer Points*—A transfer point is a platform or play structure along an accessible route of travel or wheelchair-accessible platform provided to allow a user to transfer from a wheelchair onto the equipment. It shall comply with the following specifications (see Fig. A1.36).

10.2.3.1 The transfer point shall be between 14 in. (360 mm) and 18 in. (460 mm) above the accessible route of travel or wheelchair-accessible platform.

10.2.3.2 The clear width of the transfer point shall be no less than 24 in. (610 mm) and the depth of the transfer point shall be no less than 14 in. (360 mm).

10.2.3.3 Handrails or other means of support shall be provided to assist users to transfer out of the wheelchair and onto the transfer platform.

10.2.4 *Turning Space at the Transfer Point* (see Fig. A1.39):

10.2.4.1 A wheelchair turning space shall be provided at the base of the transfer point. The turning space shall be a clear space 60 in. (1.52 m) in diameter or a T-shaped area in accordance with Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities, Section 4.2.3.

10.2.4.2 The turning space at the transfer point shall accommodate one wheelchair. If additional parking spaces are necessary, they shall be no less than 30 in. (760 mm) wide by 48 in. (1220 mm) long and shall be located out of the accessible route of travel in accordance with Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities, Section 4.2.4.1.

10.2.5 *Wheelchair-Accessible Platforms*—Decks or platforms that are elevated above the protective surfacing of the use zone and that are accessible to wheelchairs shall comply with the following specifications:

10.2.5.1 The clear width for single wheelchair passage shall be not less than 36 in. (915 mm) in accordance with Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities, Section 4.2.1. Clear width may be reduced to 32 in. (810 mm) for not more than 24 in. (610 mm) along the path of travel (see Fig. A1.37).

10.2.5.2 The clear width for two wheelchairs to pass shall be not less than 60 in. (1520 mm) in accordance with Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities, Section 4.2.2.

10.2.5.3 The clear width for one wheelchair and one able-bodied user shall not be less than 44 in. (1120 mm).

10.2.5.4 Openings between deck members of wheelchair-accessible surfaces shall be not greater than 0.50 in. (13 mm).

10.2.5.5 Guardrails or protective barriers shall be provided for all elevated wheelchair-accessible platforms. These features shall be in accordance with 4.8 and Sections 6.1, 7.4.3, and 7.4.4 of this specification (see Fig. A1.38).

10.2.5.6 Elevated wheelchair-accessible platforms with a guardrail shall also have a curb that projects no less than 2 in. (50 mm) above the platform surface.

10.2.5.7 Turning spaces and parking spaces provided on a wheelchair-accessible platform shall conform to the turning space specifications of 10.2.4.1. The turning space and parking space shall not overlap (see Fig. A1.39a).

10.3 *Allowing the User to Interact with the Equipment:*

10.3.1 *Accessible Stepped Platforms*—Platforms or steps within a play structure, provided to facilitate a child with mobility impairments to move from one height to another shall conform to the following specifications:

10.3.1.1 The vertical rise shall be not greater than 8 in. (200 mm).

10.3.1.2 The platform or step shall be not less than 14 in. (350 mm) deep and not less than 24 in. (610 mm) wide.

10.3.2 *Accessible Play Opportunities:*

10.3.2.1 Accessible play opportunities designed with different access and egress points, such as slides, must allow the user an opportunity to return unassisted to the original transfer point after egress from the equipment.

10.3.2.2 Equipment, such as water and sand tables, that require the user in a wheelchair to pull partially under the equipment shall have a vertical leg clearance of not less than 24 in. (610 mm).

(1) The top of the playing surface of such equipment shall not be greater than 30 in. (760 mm) above the accessible

surface in accordance with the Recommendations for Accessibility to Serve Physically Handicapped Children in Elementary Schools, Section 4.19 (see Fig. A1.40).

10.3.2.3 Upper-body equipment, such as horizontal ladders and rings, that are intended for users in wheelchairs shall have the object to be grasped less than or equal to 54 in. (1400 mm) above the accessible surface (see Fig. A1.41).

10.3.2.4 Manipulatable equipment, such as steering wheels and interactive panels, that are intended for users in wheelchairs shall be positioned within the wheelchair user side reach limitations of not less than 9 in. (230 mm) but not greater than 48 in. (1220 mm) from the accessible surface (see Fig. A1.42).

10.3.2.5 Manipulatable equipment, such as steering wheels and interactive panels, that are intended for users in wheelchairs shall be positioned within the wheelchair user front reach limitations of not less than 20 in. (508 mm) but not greater than 36 in. (915 mm) from the accessible surface (see Fig. A1.43).

11. **Installation**

11.1 *Designer's or Manufacturer's Responsibilities:*

11.1.1 The designer or manufacturer shall provide clear and concise instructions and procedures for the installation of each play structure designed or provided, as well as a complete parts list.

11.2 *Owner's/Operator's Responsibilities:*

11.2.1 The owner/operator shall follow the designer's or manufacturer's instructions and procedures to install all play structures provided.

11.2.2 The owner/operator shall install protective surfacing within the use zone of each play structure in accordance with Specification F 1292 appropriate for the fall height of each structure.

12. **Structural Integrity**

12.1 The structural integrity tests are intended to be conducted by manufacturers on equipment at a test site and are not intended to be performed on equipment installed on the playground or as part of a routine maintenance program. This section is based on the use of performance tests for structural integrity. Performance tests require a definite end point (that can be physically measured) and that the safety factors be included in the loading criteria.

12.2 *Loading Test Criteria*—After conducting the tests in 12.3.1 through 12.5.2 there shall be no visible crack or breakage of any component and no form of permanent deformation of any component that may adversely affect the structural integrity or safe use of the equipment. After removal of the load, hooks, shackles, rings, or links shall not have opened to more than 0.040 in. (1 mm).

12.3 *Strength of Swing Components and Structures:*

12.3.1 Swing assemblies (swing seats, connectors, suspending members, and bearing/hanger assembly) shall be installed in accordance with the manufacturer's installation instructions or supported in an equivalent manner. The test load shall be applied through appropriate load distribution devices. The load distribution device shall be either a loading block(s) or a strap(s) having the dimensions shown in Fig. A1.44.

12.3.1.1 For swing assemblies intended for single occu-

pancy, a load-distribution device shall be centered on the seat and a vertical downward force of 750 lbf (3336 N) shall be applied. The force shall be applied gradually, attaining but not exceeding 750 lbf within a period of 1 min and maintained for 5 min.

12.3.1.2 For swing assemblies intended for multiple occupancy, a load distribution device shall be centered on each sitting position. A vertical downward force of 605 lbf (2691 N) shall be applied to each loading device simultaneously. The force shall be applied gradually, attaining but not exceeding 605 lbf per device, within a period of 1 min and maintained for 5 min.

12.3.1.3 For swing supporting structures, simultaneously apply at each swing location a vertical downward force of 750 lbf (3336 N) for single-occupancy swings or 605 lbf (2691 N) times the number of intended users for multiple-occupancy swings. Apply the force gradually at locations representing the swing in its "at rest" position. The manufacturer of the multiple-occupancy swing shall specify the number of intended users.

12.4 Components and Structures Subjected to Vertical Loads:

12.4.1 Determine the number of simultaneous users, n , of a component or structure as specified in this section. If n is not a whole number, round to the nearest whole number. Place n load distribution devices on the component or structure in a manner that simulates the anticipated load distribution. Simultaneously load each load distribution device with a downward vertical force, F , given by the following equation:

$$F(\text{lbf}) = 250(n + 1)/n$$

or

$$F(\text{N}) = 1113(n + 1)/n$$

The force shall be applied gradually within a period of 1 min and maintained for a period of 5 min.

12.4.1.1 *Individual Longitudinal Components*—(These would include a ladder rung, turning/chinning bars, and so forth.) Measure the length of the component, L , in inches (centimetres) and determine the number of users n from the following table. (Round to the nearest whole number.) After the number of users has been determined, apply this number to the equation given in 12.4.1. After the load for each loading device has been calculated by the equation, multiply the load by the number of users to obtain the anticipated load.

Determining Number of Users for Individual Longitudinal Components	
Length of Component	Estimated Number of Users
$L \leq 24$ in.	$n = 1$
$L > 24$ in.	$n = L/16$
$L \leq 610$ mm	$n = 1$
$L > 610$ mm	$n = L/41$

12.4.1.2 *Structures Containing Two or More Longitudinal Components*—(These would include horizontal ladders, overhead climbers, and upper-body components.) Count the number of longitudinal components, LC , and determine the number of users, n , from the following table. (Round to the nearest whole number.) After the number of users has been determined, apply this number to the equation given in 12.4.1. After the load for each loading device has been calculated by the equation, multiply the load by the number

of users to obtain the anticipated load.

Determining Number of Users for Structure Containing Two or More Longitudinal Components

Number of Longitudinal Components	Estimated Number of Users
$LC \leq 5$	$n = LC$
$LC > 5$	$n = (LC + 5)/2$

12.4.1.3 *Individual Surfaces*—Compute the surface area, A , in square feet (square metres) and determine the number of users, n , from the following table. (Round to the nearest whole number.) After the number of users has been determined, apply the number to the equation given in 12.4.1. After the load for each loading device has been calculated by the equation, multiply the load by the number of users to obtain the anticipated load.

Determining Number of Users for Individual Surfaces

Surface Area, ft ²	Estimated Number of Users
$A \leq 1$	$n = 1$
$A > 1$ and $A \leq 10$	$n = A$
$A > 10$	$n = (A + 10)/2$
Surface Area, m ²	Estimated Number of Users
$A \leq 0.09$	$n = 1$
$A > 0.09$ and $A \leq 0.93$	$n = 10.8 A$
$A > 0.93$	$n = 10.8(A + 0.93)/2$

12.4.1.4 *Slide Beds*—Determine the number of users, n , as follows: $n = L \div 36$, where L equals the length of the slide bed in inches, or $n = L \div 0.9$, where L equals the length of the slide bed in metres. (Round to the nearest whole number.) Place n load distribution devices equally spaced on the slide bed. Simultaneously load each distribution device with a downward vertical force given by the equation in 12.4.1. The force shall be applied gradually within a period of 1 min and maintained for a period of 5 min. After the load for each loading device has been calculated by the equation, multiply the load by the number of users to obtain anticipated load.

12.4.1.5 *Components with Designated Occupancy*—The number of users, n , is equal to the number of designated occupants. After the number of users has been determined, apply the number to the equation given in 12.4.1. After the load for each loading device has been calculated by the equation, multiply the load by the number of users to obtain anticipated load.

12.5 *Components Subjected to Lateral Loads*—Components subjected to lateral loads such as guardrails, protective barriers, handrails, and so forth should be subjected to two separate load tests. The force shall be applied gradually within a period of 1 min and maintained for a period of 5 min.

12.5.1 *Accidental Concentrated Load Test*—Place a load distribution device on the component at any point to produce the most adverse effect. Apply a 460-lbf (2046-N) horizontal force to the load distribution device in a direction perpendicular to the length of the component away from the enclosed structure.

12.5.2 *Surge Distributed Load Test*—Apply a horizontal force, F , in a direction perpendicular to the length of the component and away from the enclosed structure. Apply the force near the top of the component and evenly distribute over the entire length of the component. The test force is given as follows:

$$F(ibf) = 150L$$

or

$$F(N) = 68L$$

where L = length of the component, ft or cm, respectively.

12.6 *Alternatives to Testing for Structural Integrity:*

12.6.1 Instead of the tests in 12.3.1 through 12.5.2, it is acceptable that a licensed architect or a licensed professional engineer certify the integrity of the equipment if it were to be subjected to the aforementioned test loads (see 12.3.1 through 12.5.2).

13. **Maintenance**

13.1 *Public Use Playground Equipment*—The designer or manufacturer of each play structure shall provide to the owner/operator clear and concise inspection, maintenance, and repair instructions, including, but not limited to, what, when, and how to inspect, maintain, and repair.

13.2 *Protective Surfacing:*

13.2.1 The owner/operator shall maintain the protective surfacing within the use zone of each play structure in accordance with Specification F 1292 appropriate for the fall height of each structure.

13.2.2 The owner/operator shall maintain the protective surfacing within the use zone of each play structure free from extraneous materials that could cause injury, infection, or disease.

13.3 *Records*—The owner/operator shall establish and maintain detailed installation, inspection, maintenance, and repair records for each public-use playground equipment area.

14. **Labeling**

14.1 Section 14 follows the classification system provided by ANSI Z535.1 and ANSI Z535.4.

14.2 Information on the wording of the labels on play structures will help ensure that appropriate information is being presented to the user, the general public, and to those responsible for the site. This information can be imparted most effectively by the use of uniform terminology or symbols, or both, on labels.

14.3 The purposes of this information are for identification and warning (1) to identify the manufacturer or the custom designer of the product, and (2) to inform, warn, and educate purchasers, installers, and those supervising children who play on the equipment about the on-going danger of installing equipment over hard surfaces. This label is to serve as a constant reminder to provide and maintain appropriate surfacing as identified by Specification F 1292 and USCPSC

1994 Handbook for Public Playground Safety.⁹

14.4 *Minimum Requirements for All Labels on Playground Equipment or Structures:*

14.4.1 *Warning Label and Manufacturer's Identification*—All play structures and composite play structures shall be required to have attached a warning label and a separate manufacturer's identification.

14.4.1.1 *Signal Word*—WARNING shall be on the warning label.

14.4.1.2 *Safety Alert Symbol*—Preceding the signal word, there shall be a triangle with an exclamation point inside the triangle on the warning label.

14.4.1.3 *Word Message on the Warning Label*—**WARNING:** Installation over a hard surface such as concrete, asphalt, or packed earth may result in serious injury or death from falls.

14.4.1.4 The manufacturer's identification shall appear, shall be durable, and shall be placed on the play structure, if it stands alone, or on a composite play structure. Custom- and community-built equipment shall also carry the identification of the designer and the warning label.

14.4.2 *Specifications for all Labels:*

14.4.2.1 Specification for all labels should conform to ANSI Z535.1 and ANSI Z535.4 in the following areas: legibility, type of lettering, clarity of message and symbol, color specifications, and word message and visibility.

14.4.2.2 *Durability of the Label*—The label should conform to UL 969. It is intended that the marking be replaced by the operator if it becomes illegible, destroyed, or removed.

14.4.2.3 *Noninjurious*—A label should be so designed that it will not cause injury.

14.4.3 *Placement/Location of the Label*—The label must be located so as not to be removed during the installation process.

14.4.4 *Attachment*—The label shall be attached so that it cannot be removed without the use of a tool. If a label cannot be attached at the factory, instructions about attaching the label need to be included with the installation information.

14.4.5 *Replacement*—The product warning labels shall be replaced by the site management when they no longer meet legibility requirements. In cases where products have an extensive expected life or where they are exposed to extreme conditions, replacement labels should be made available by the product producer.

⁹ Available from Consumer Product Safety Commission, Washington, DC 20207.

ANNEX
(Mandatory Information)

A1. FIGURES

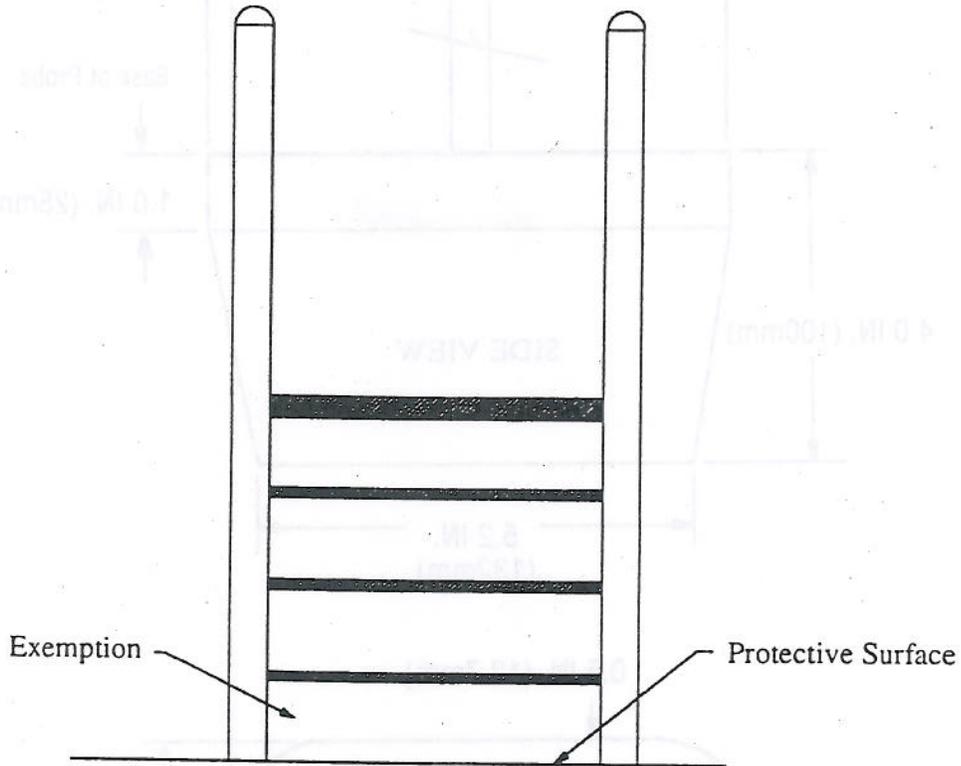
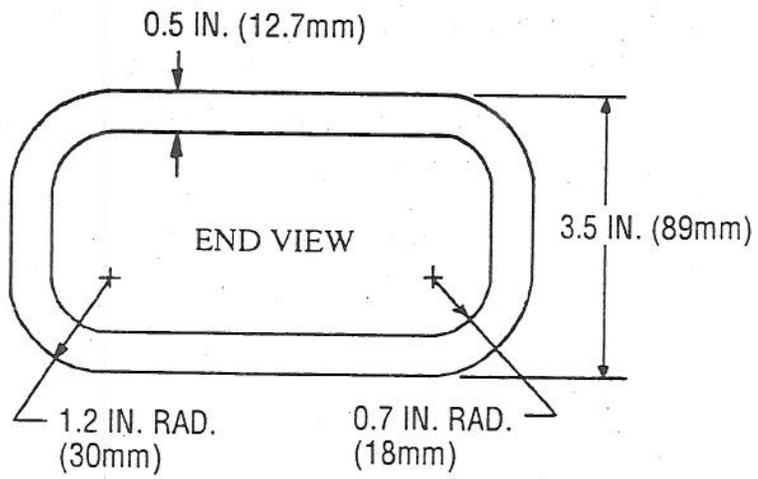
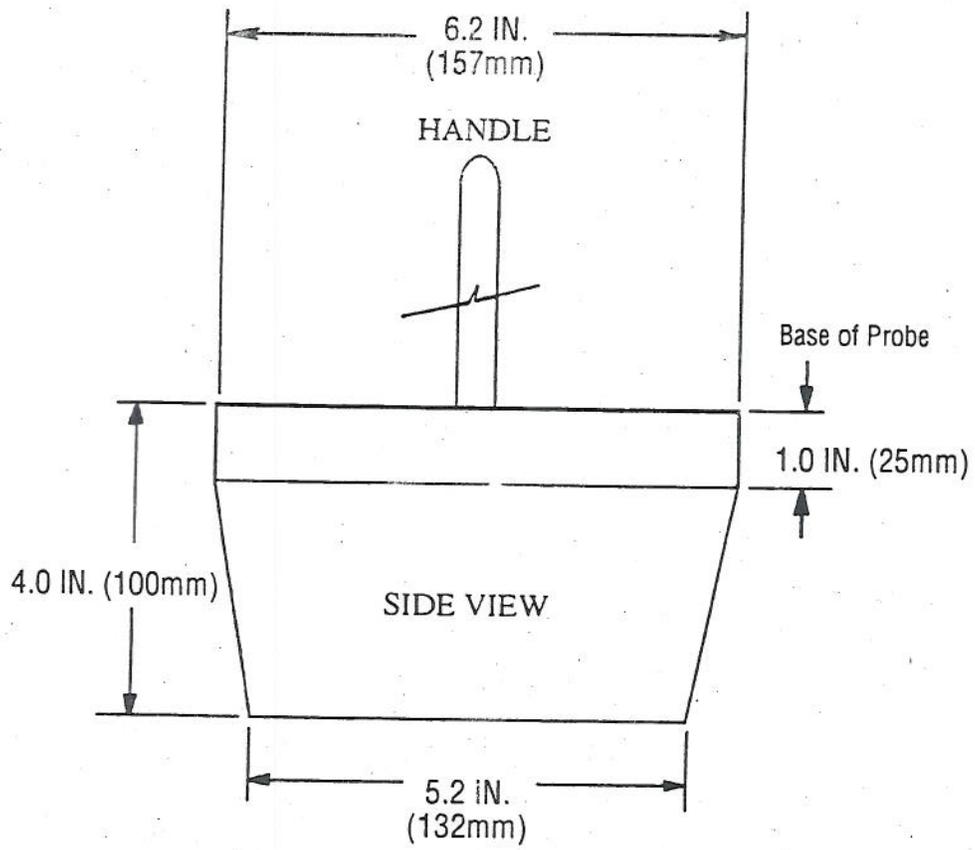


FIG. A1.1 Openings Where the Protective Surface Forms the Lower Boundary of the Opening (Example Would Be the Space Formed Between the Bottom Rail or Rung and the Protective Surface)



Material: Any rigid material

FIG. A1.2 Torso Probe

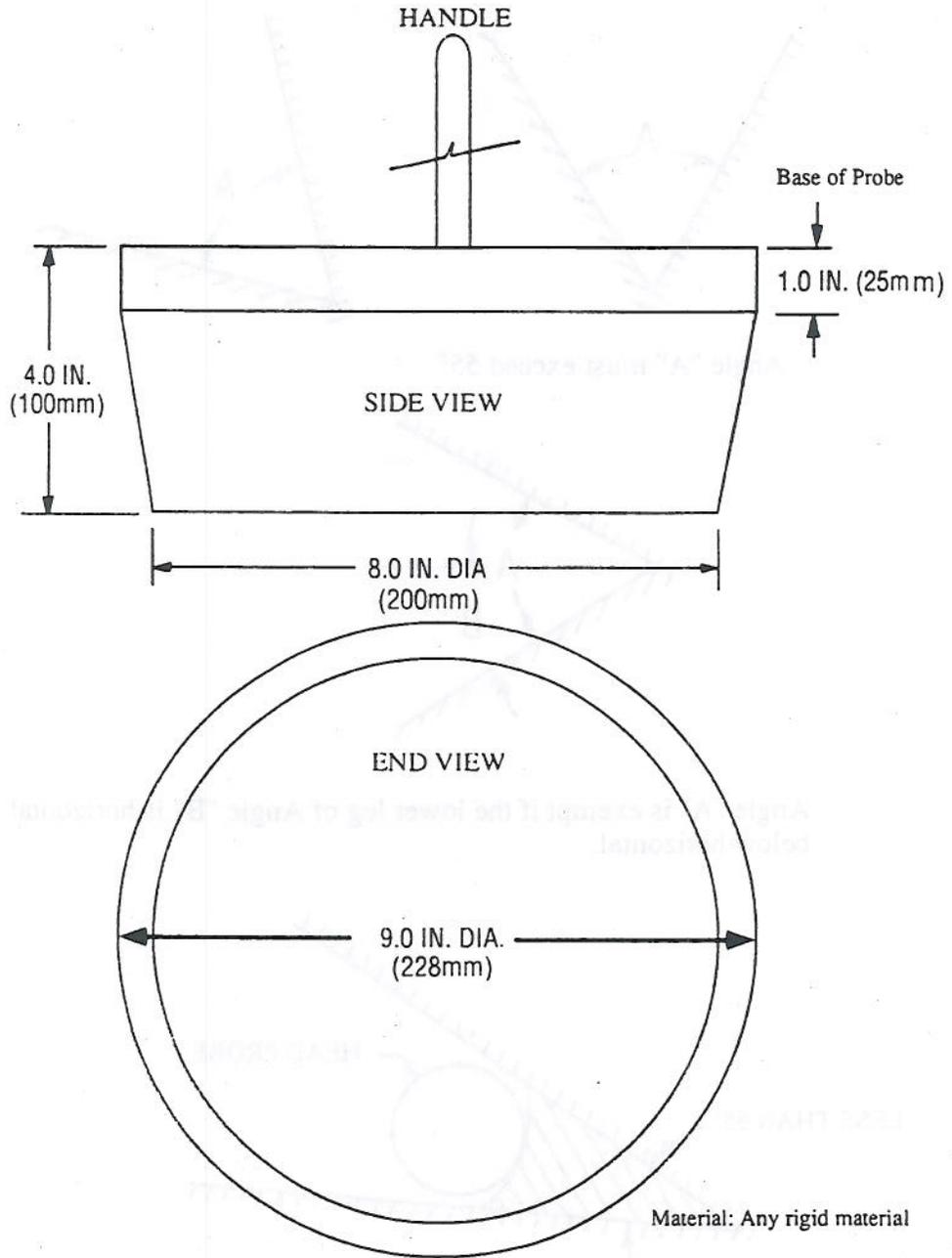
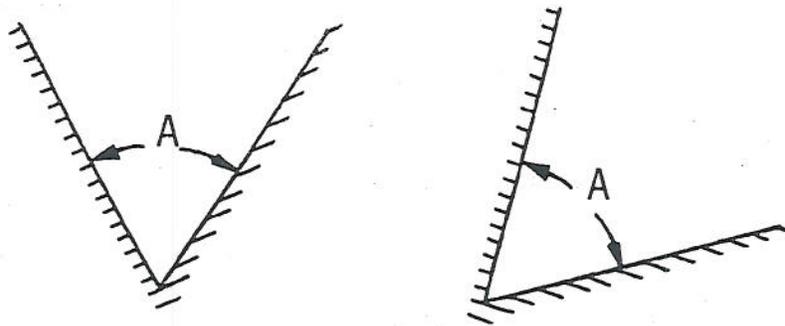
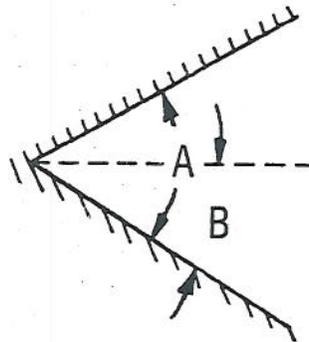


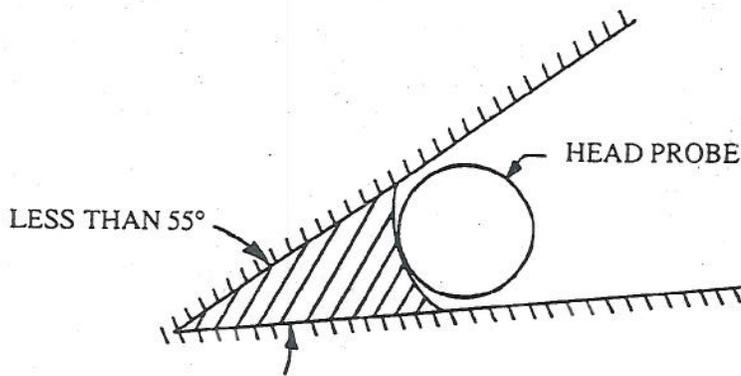
FIG. A1.3 Head Probe



Angle "A" must exceed 55°

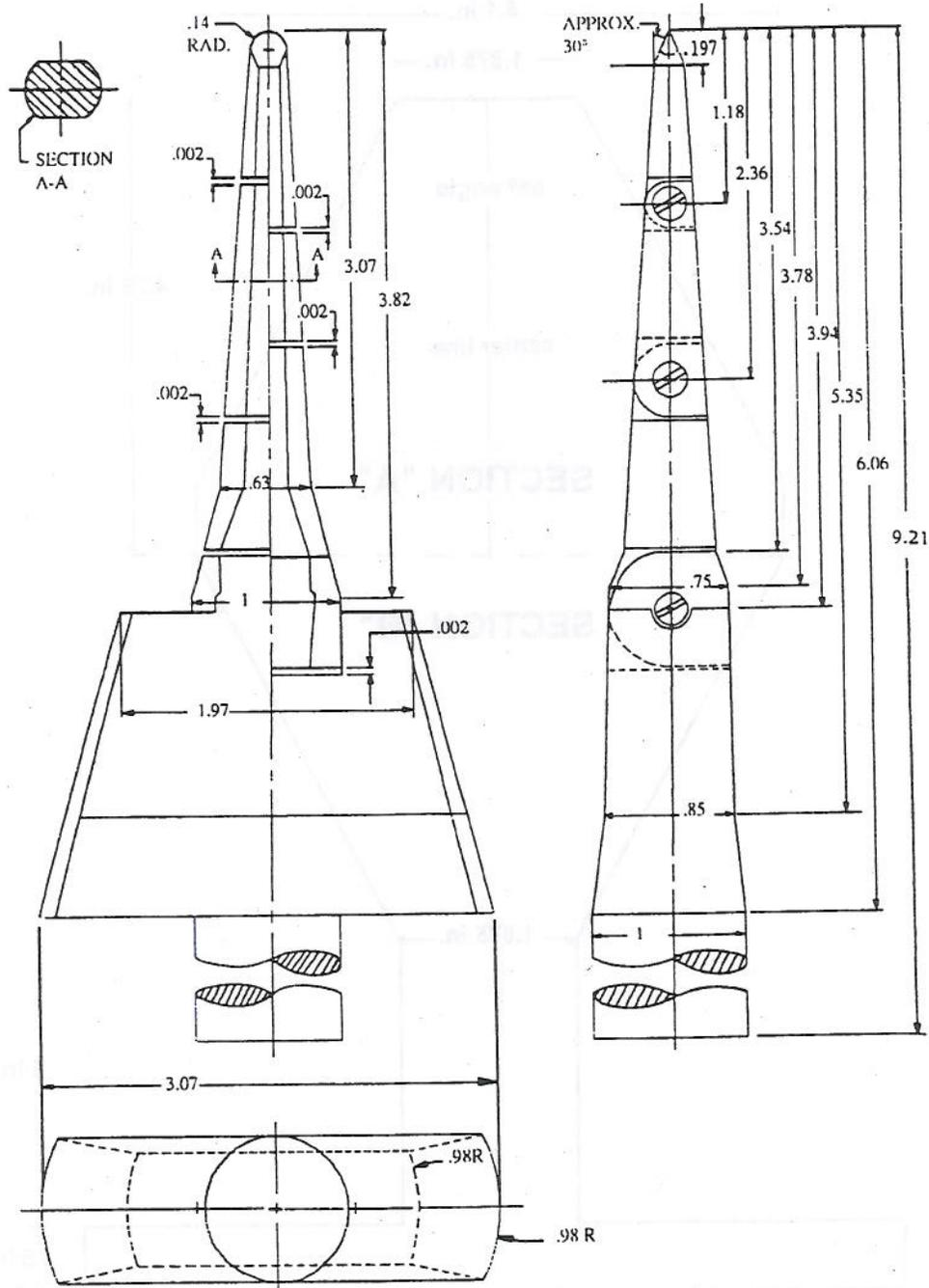


Angle "A" is exempt if the lower leg of Angle "B" is horizontal or below horizontal.



Filled Apex Illustration of shield for angles

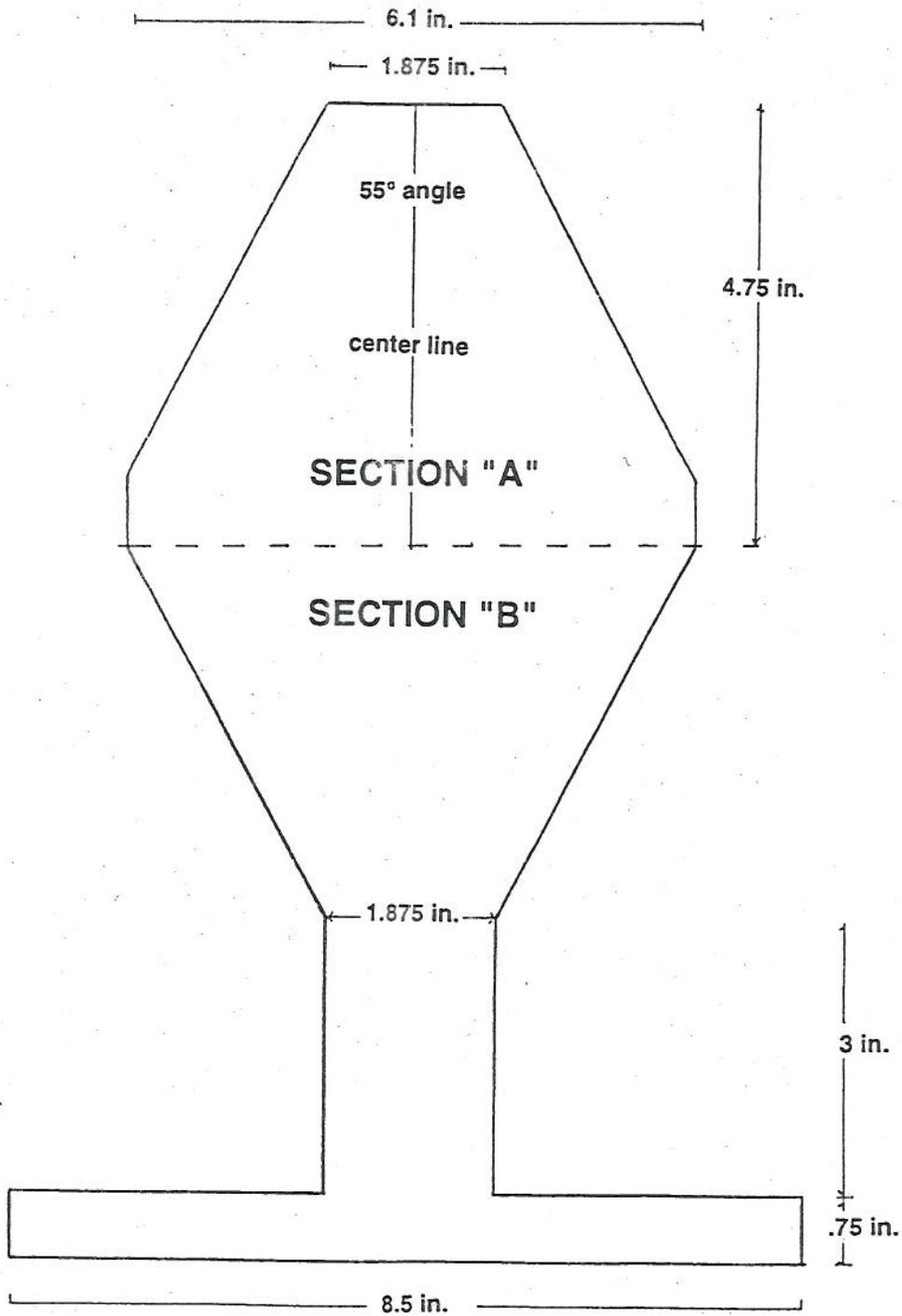
FIG. A1.4 Recommendations for Angles



NOTE—All dimensions are in inches.

FIG. A1.5 Accessibility Probe[®]

[®] "Articulated Web Stop" probe, available from Underwriters Laboratories, 333 Pfingsten Rd., Northbrook, IL 60062, Attn: Publications Stock. Phone: (708) 272-8800 Ext. 42968, Fax: (708) 509-6249.



NOTE—Template to be constructed of any rigid material 0.75 in. (19 mm) thick.

FIG. A1.6a Test Template for Partially Bounded Openings

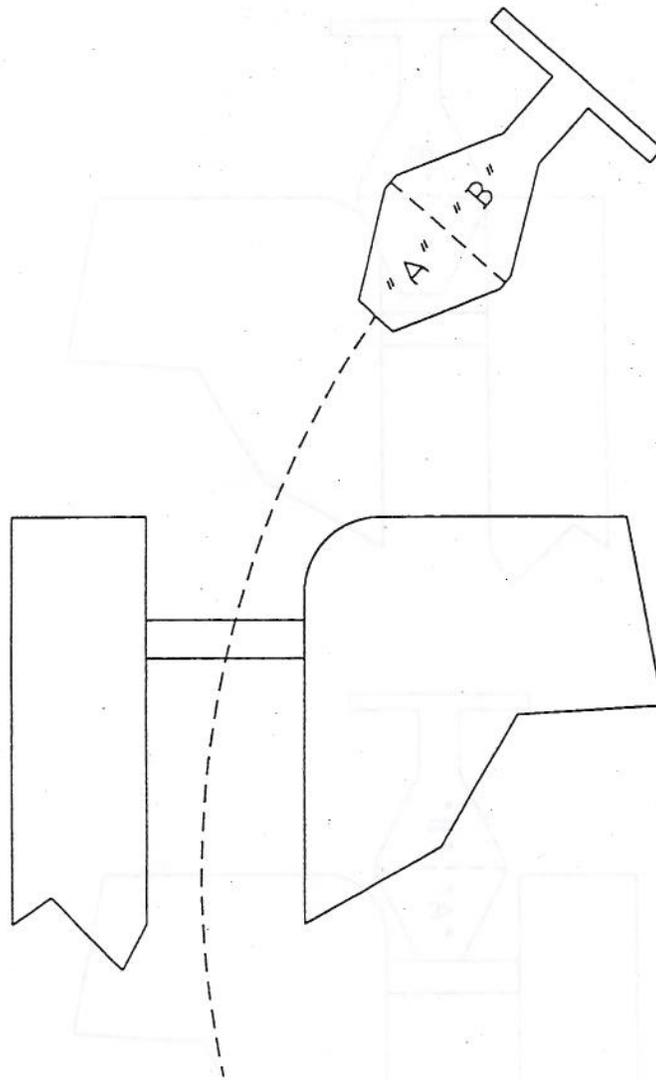
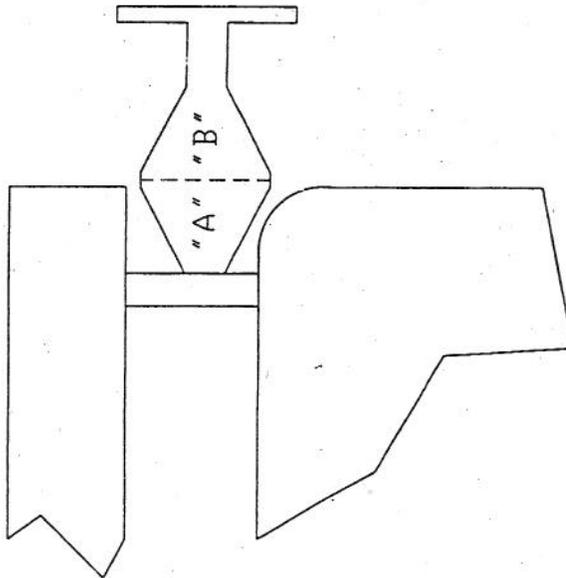
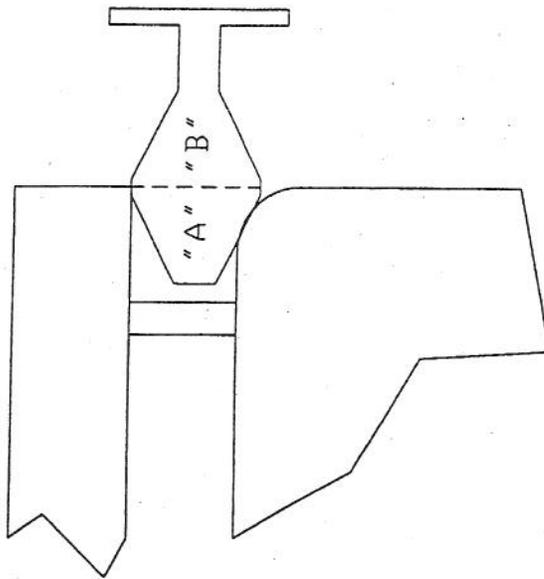


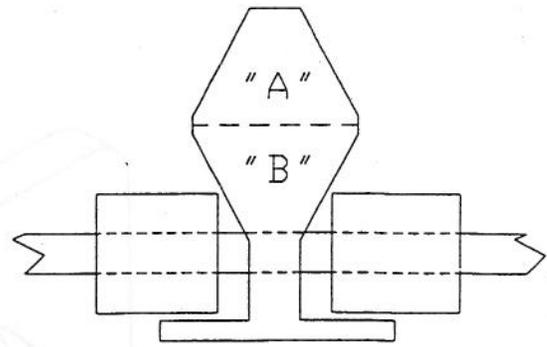
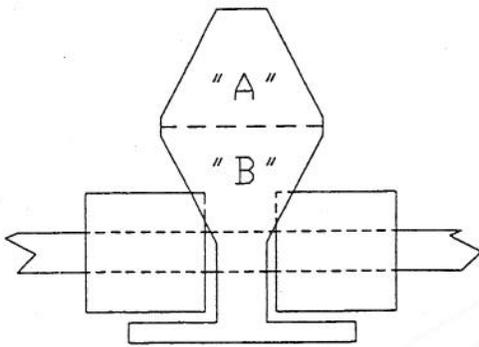
FIG. A1.6b Inserting the "A" Portion of the Test Template into the Opening Following the Centerline of the Opening



Fail—There is simultaneous contact between the two sides of the "A" template and the sides making up the boundary of the opening. The opening should be tested further using the "B" portion of the template.

Pass—The bottom of the "A" template is resting on the lower boundary of the opening and there is not simultaneous contact between the two sides of the template and the sides making up the boundary of the opening.

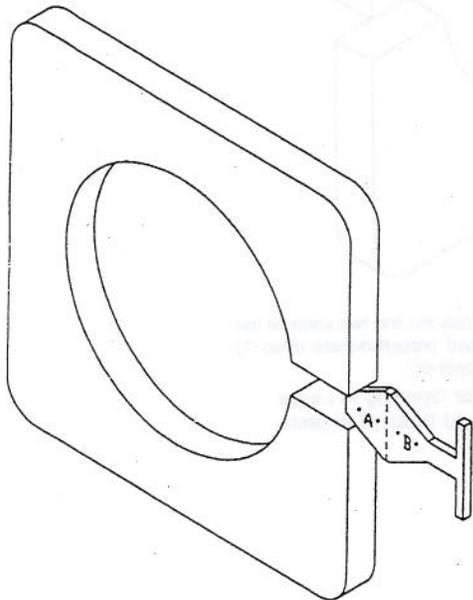
FIG. A1.7 Test Template for Partially Bounded Openings



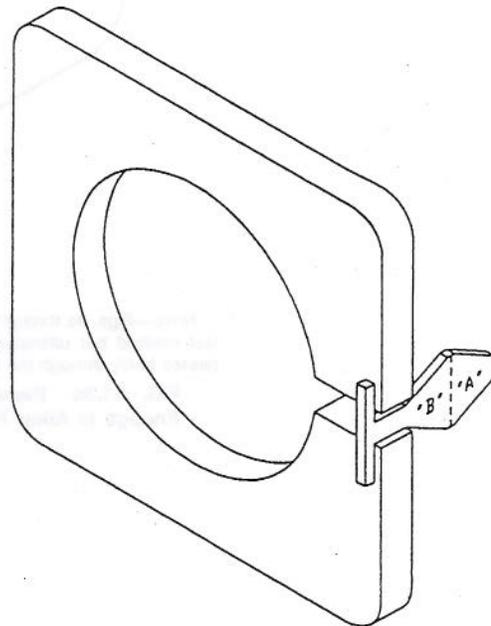
Pass—The thickness of the component forming the opening is too thick to allow the "B" portion of the template to pass into the opening.
 Fail—The thickness of the component forming the opening allows the "B" portion of the template to pass into the opening to a depth greater than 0.75 in. (19 mm).

FIG. A1.8 Exemption for a Thick Surface Condition Using the "B" Portion of the Test Template

STEP 1



STEP 2



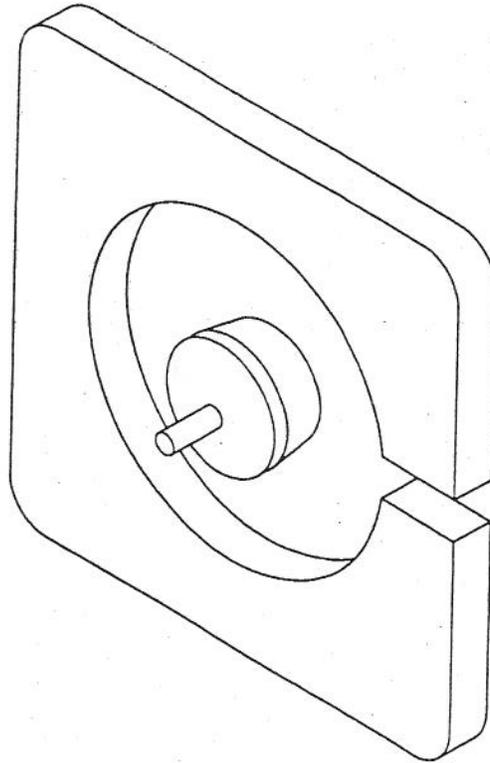
NOTE—Figs. 9a through 9c show an opening that fails the first two steps of the test method but ultimately passes because the head probe/template (Step 3) passes freely through the boundaries of the interior opening.

FIG. A1.9a Fails the "A" Portion of the Test Template Test

NOTE—Figs. 9a through 9c show an opening that fails the first two steps of the test method but ultimately passes because the head probe/template (Step 3) passes freely through the boundaries of the interior opening.

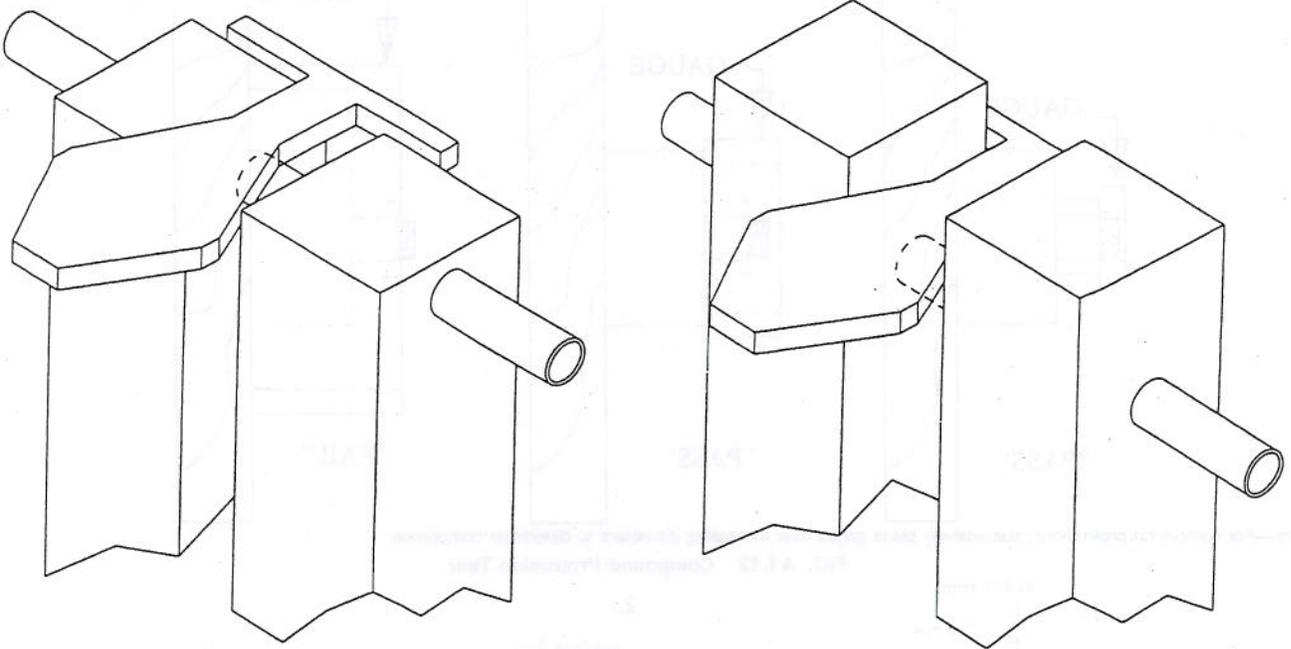
FIG. A1.9b Fails the "B" Portion of the Test Because the Thickness of the Component Does Not Prevent Access into the Opening

STEP 3



NOTE—Figs. 9a through 9c show an opening that fails the first two steps of the test method but ultimately passes because the head probe/template (Step 3) passes freely through the boundaries of the interior opening.

FIG. A1.9c Passes Because the Interior Opening is Large Enough to Allow Full Passage of the Head Probe/Template



Pass-Depth of the Opening is Less Than 0.75 in. (19 mm)

Fail-Depth of the Opening is Greater Than 0.75 in. (19 mm) and is Considered Accessible

FIG. A1.10 Exemption: A Partially Bounded Opening Is Not Considered Accessible if the Template Can Not Penetrate the Opening to a Depth Greater than 0.75 in. (19 mm) (Thickness of the Test Template)

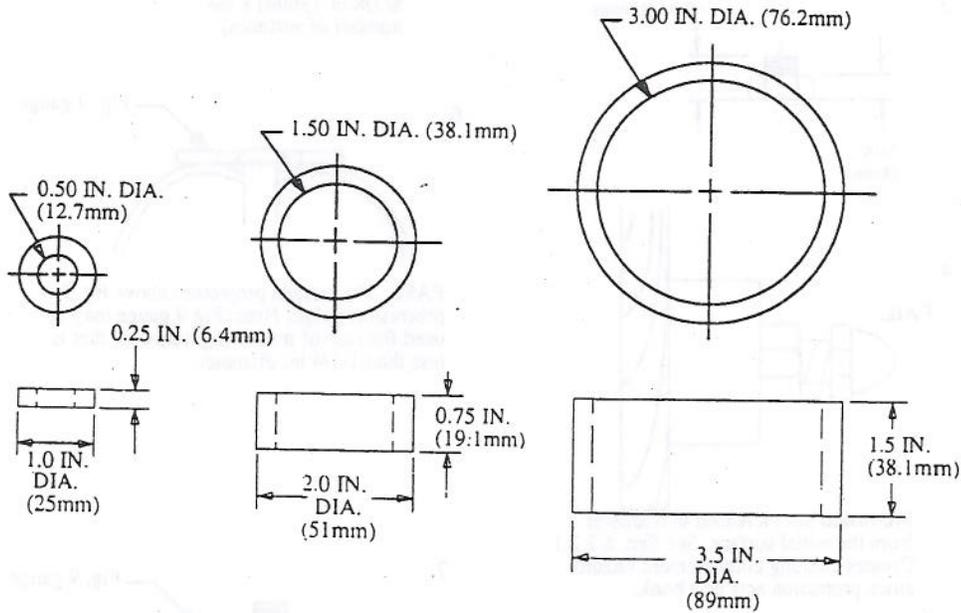
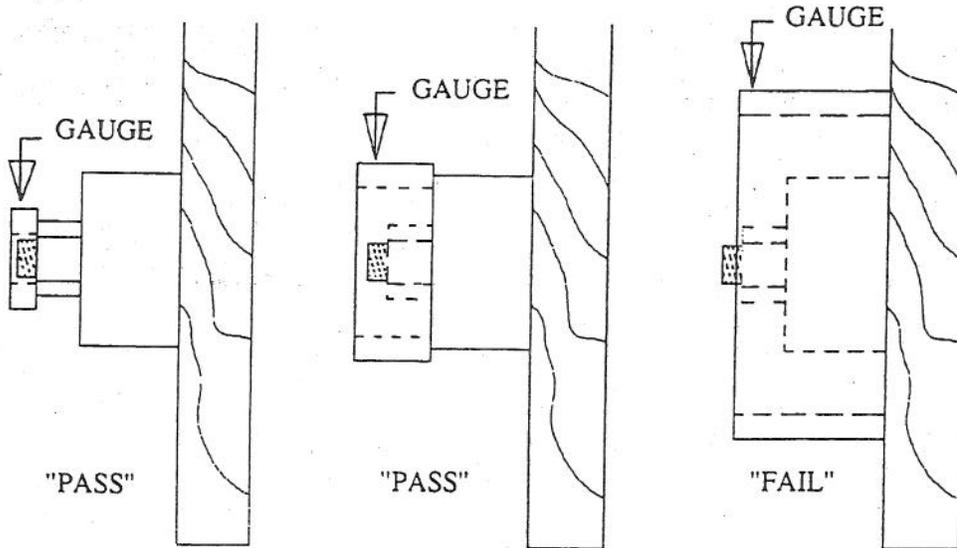


FIG. A1.11 Protrusion Test Gages



NOTE—For compound protrusions, successively place gages over increasing diameters to determine compliance.

FIG. A1.12 Compound Protrusion Test

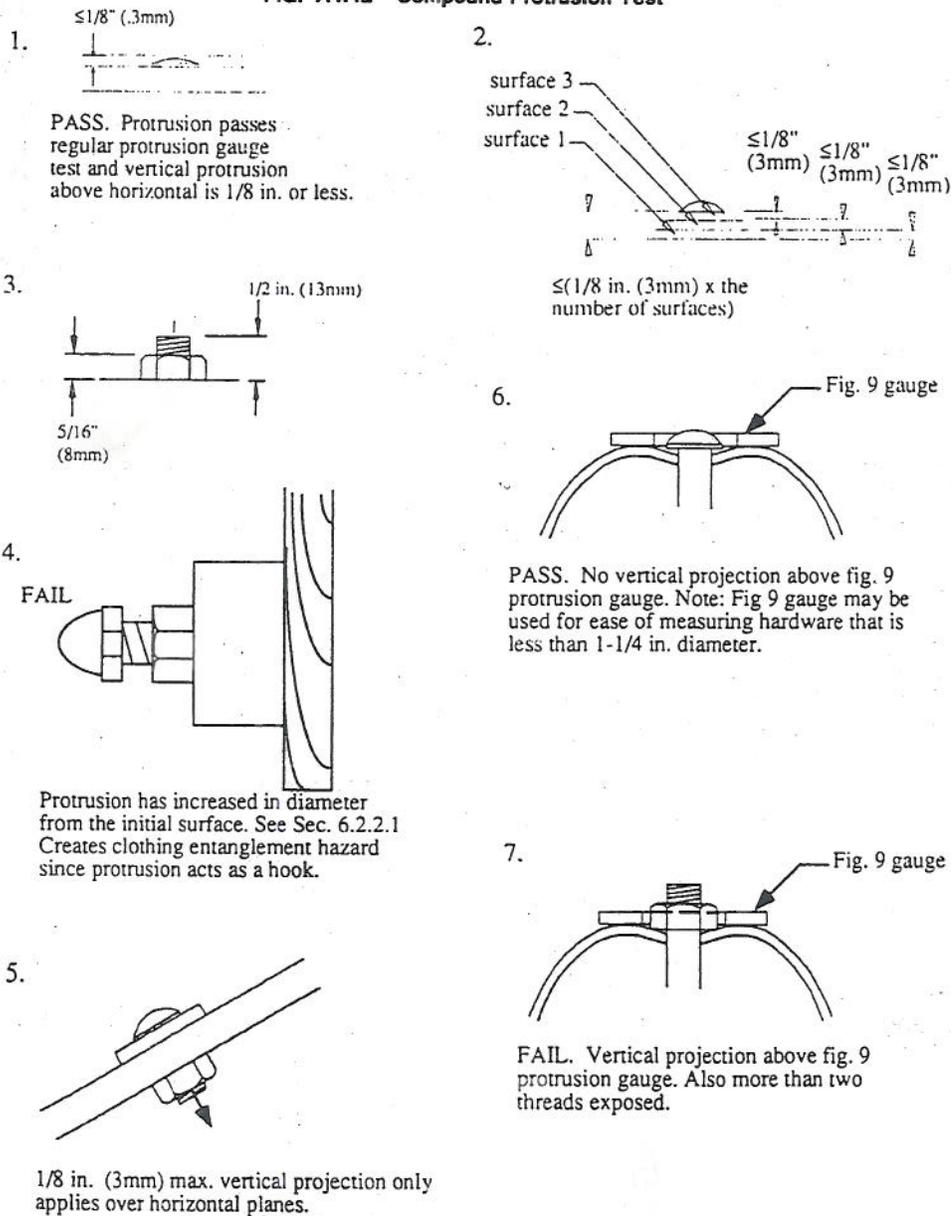
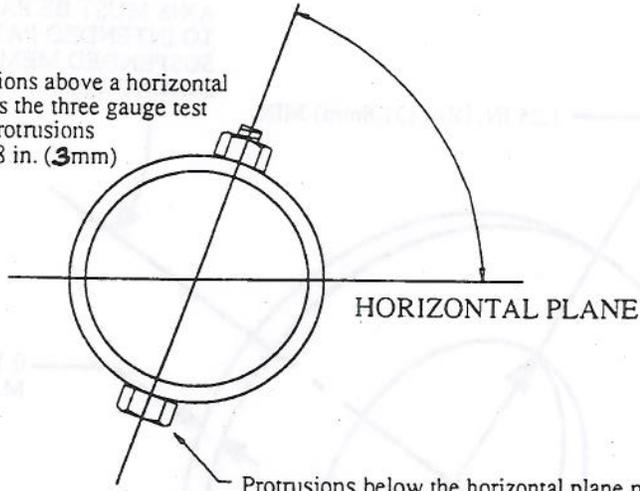


FIG. A1.13 Use of Protrusion Gages

1.

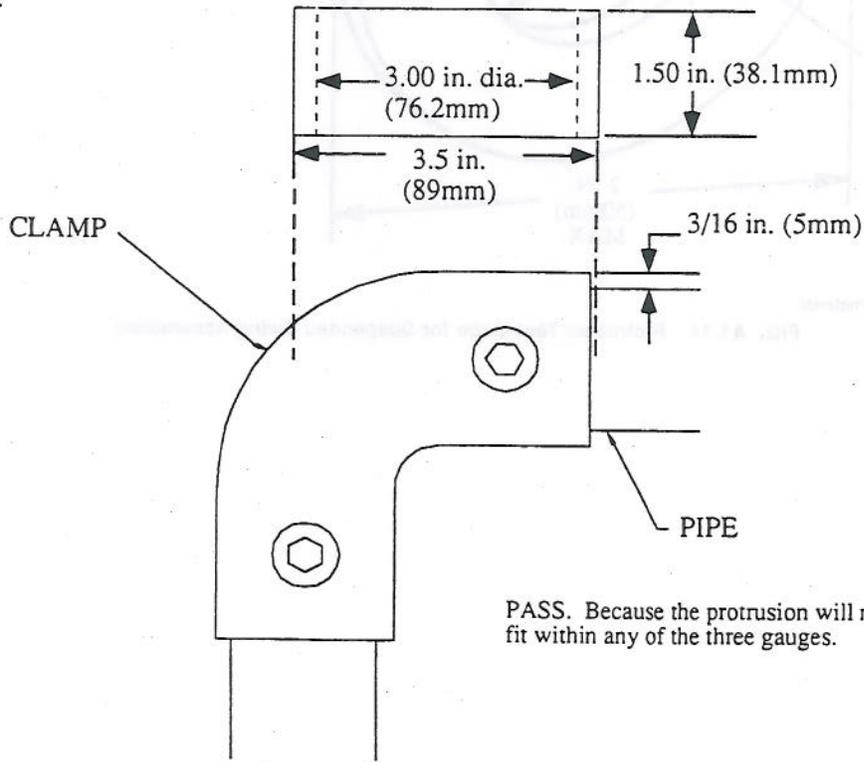
FAIL. Protrusions above a horizontal plane must pass the three gauge test plus have no protrusions greater than 1/8 in. (3mm)



Protrusions below the horizontal plane must meet the three protrusion test gauges only.

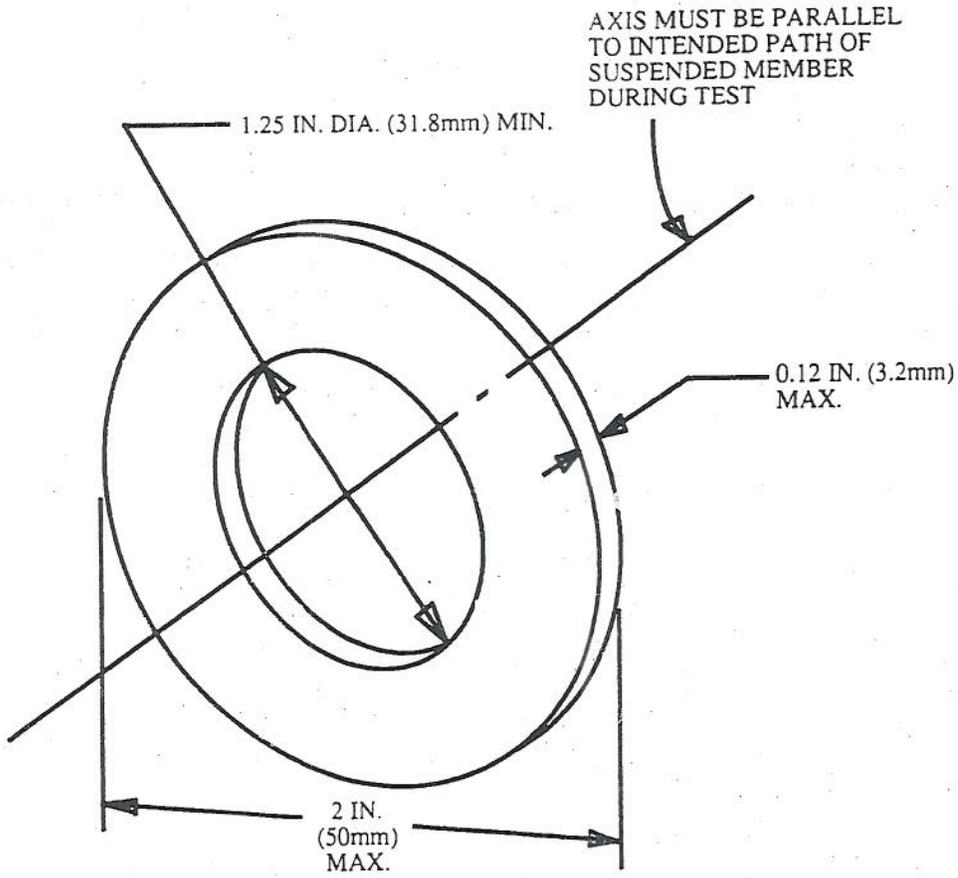
2.

LARGE PROTRUSION TEST GAUGE



PASS. Because the protrusion will not fit within any of the three gauges.

FIG. A1.13a Use of Protrusion Gages



NOTE—Gage made of any rigid material.

FIG. A1.14 Protrusion Test Gage for Suspended Swing Assemblies

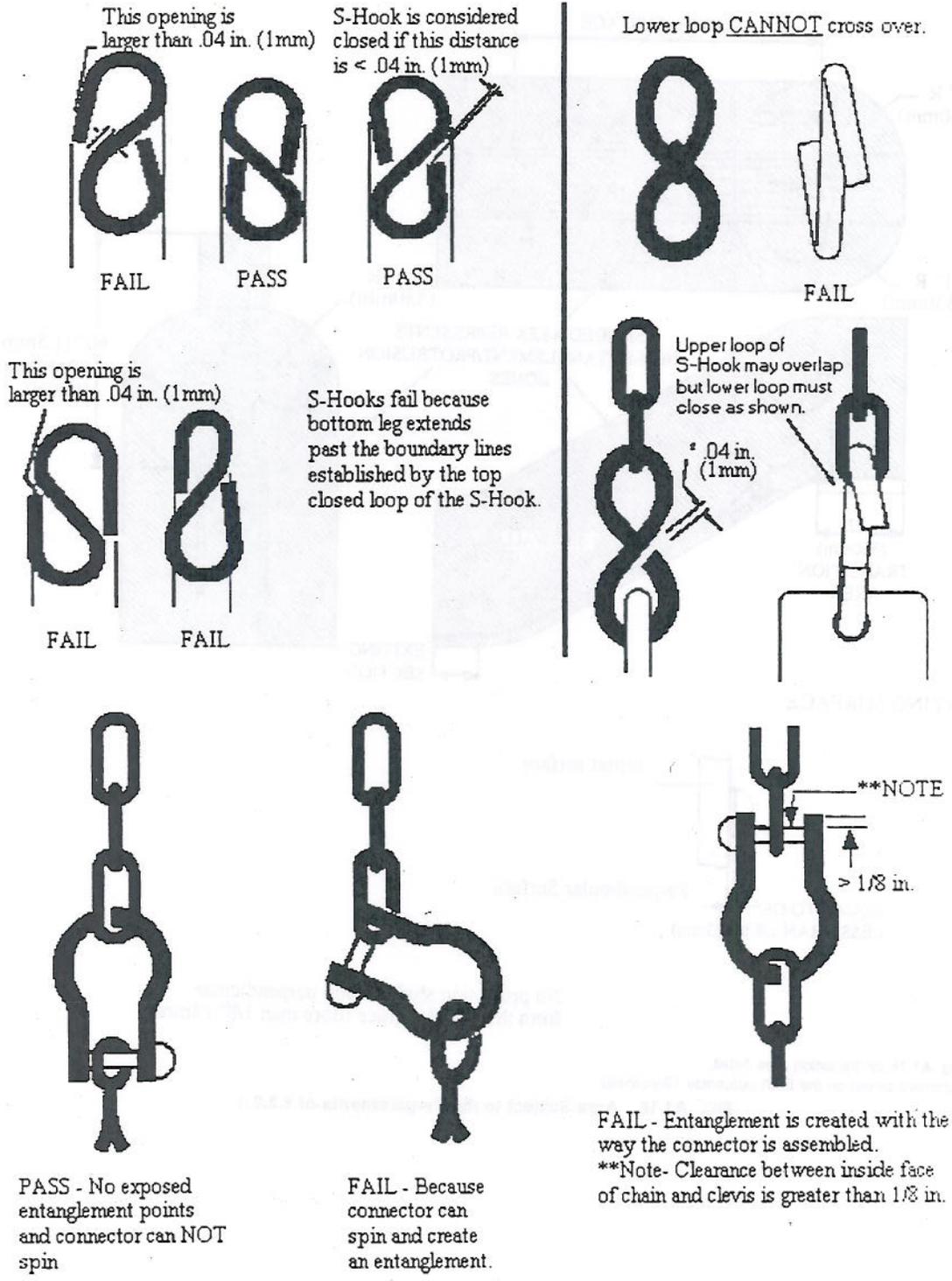
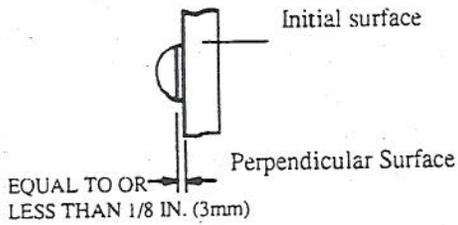
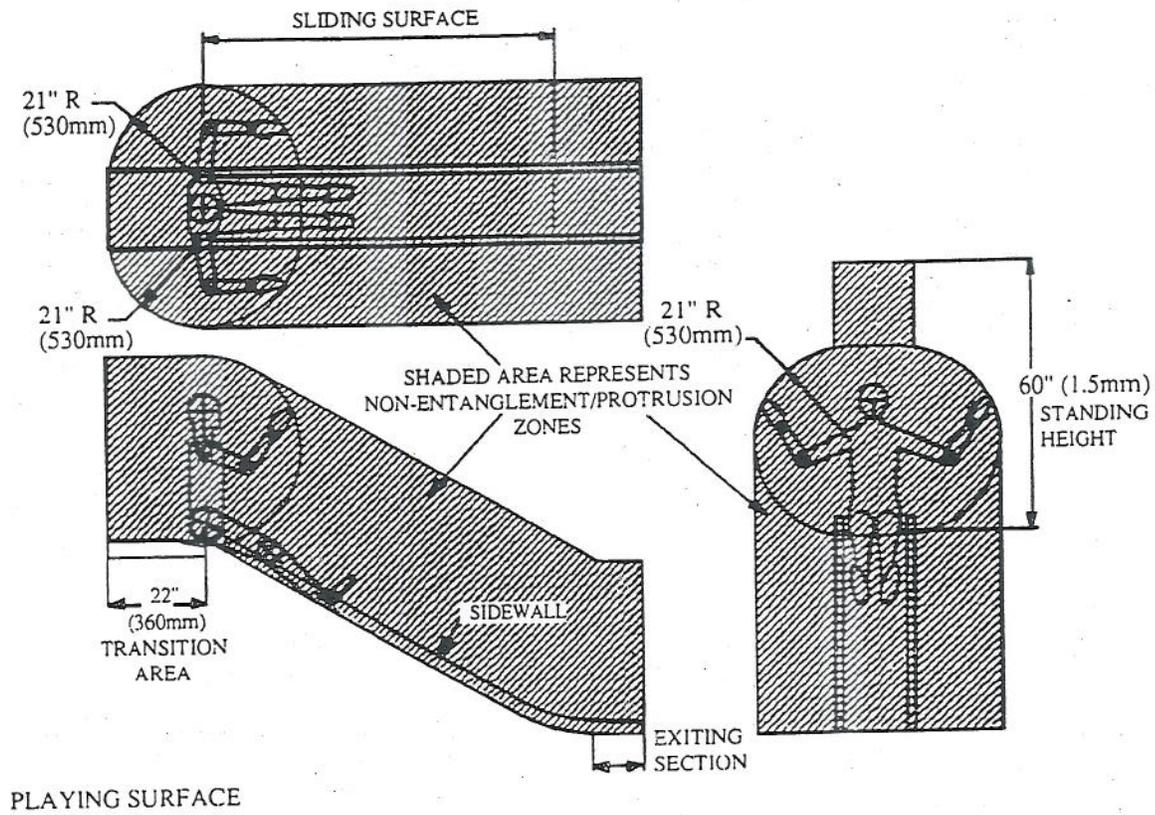


FIG. A1.15 Requirements for Fastening Devices



No projection shall extend perpendicular from the initial surface more than 1/8" (3mm).

NOTE 1—See Fig. A1.16 for transition area detail.
 NOTE 2—Measurement based on the 95th percentile 12-year-old.

FIG. A1.16 Area Subject to the Requirements of 6.3.2.1

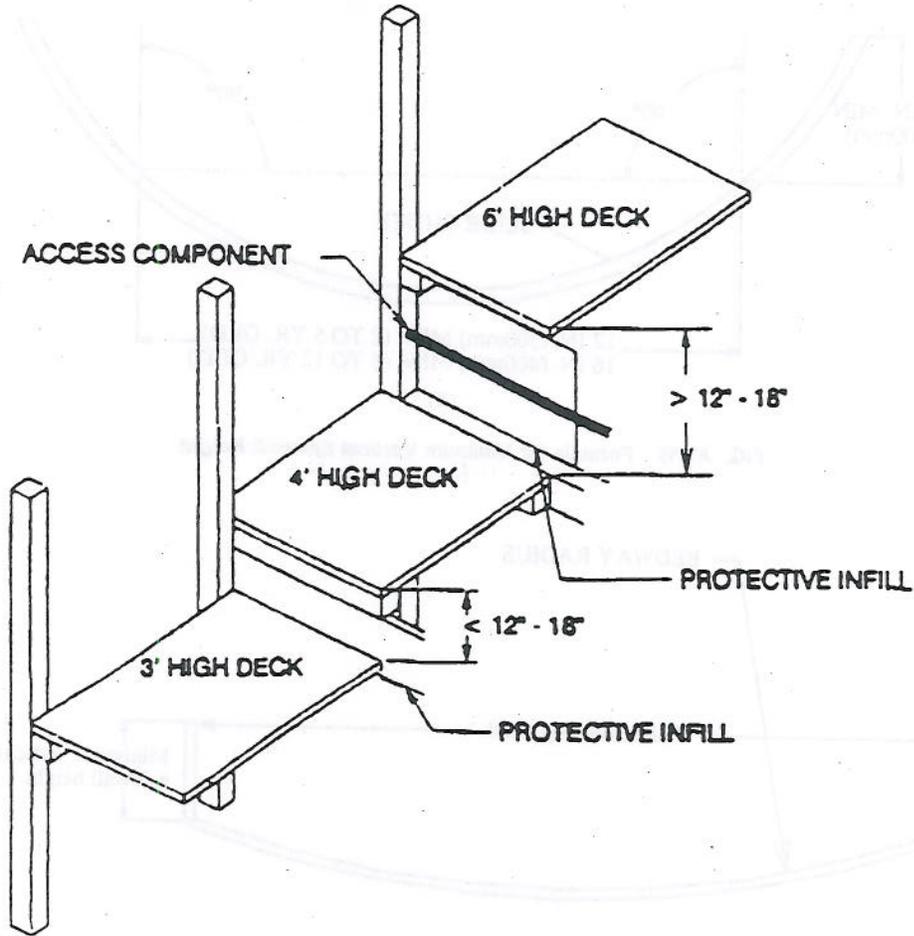


FIG. A1.17 Access Component Between Adjacent Decks

SLIDES

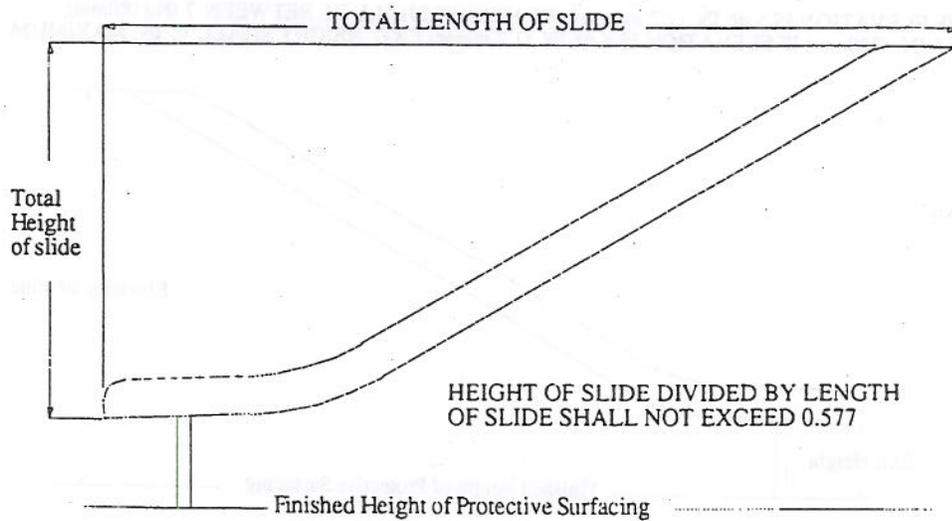


FIG. A1.18 Height/Length Ratio of Sliding Surface

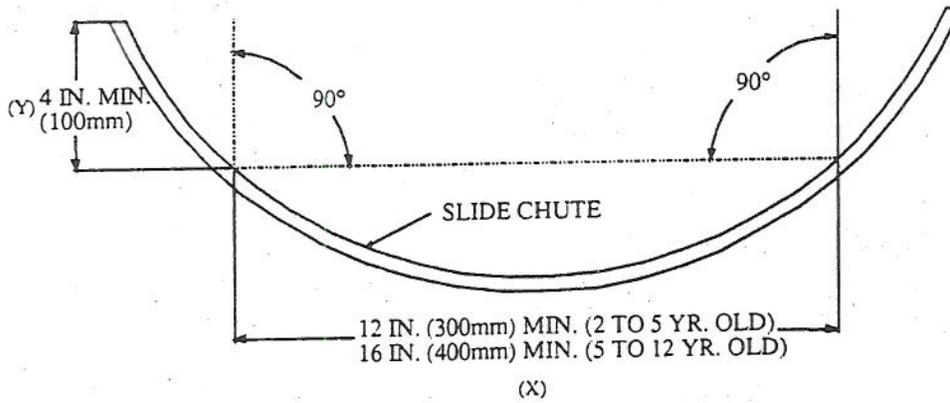
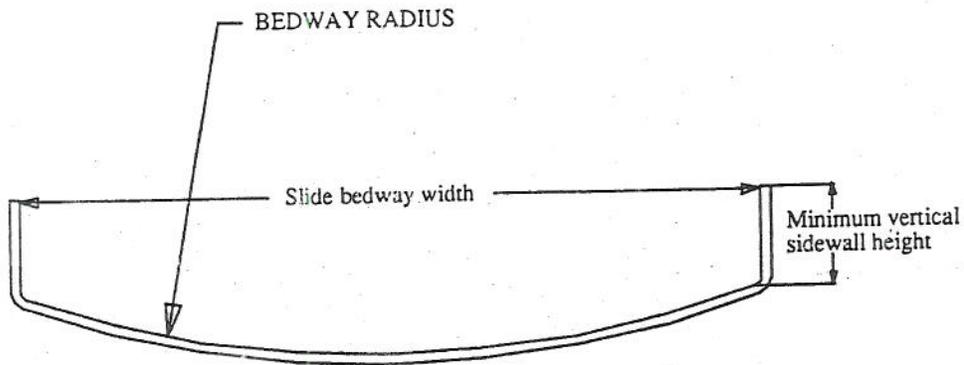


FIG. A1.19 Formula for Minimum Vertical Sidewall Height



$$H = 4 \text{ IN.} \cdot \frac{2 \times \text{Bedway width}}{\text{Bedway radius}}$$

FIG. A1.19a Formula for Minimum Vertical Sidewall Height

IF ELEVATION IS > 48 IN. (1.2 meter) EXIT HEIGHT SHALL BE BETWEEN 7 IN.(180mm) - 15 IN. (380mm) IF ELEVATION IS ≤ 48 IN. (1.2 meter) EXIT HEIGHT SHALL 11 IN. MAXIMUM.

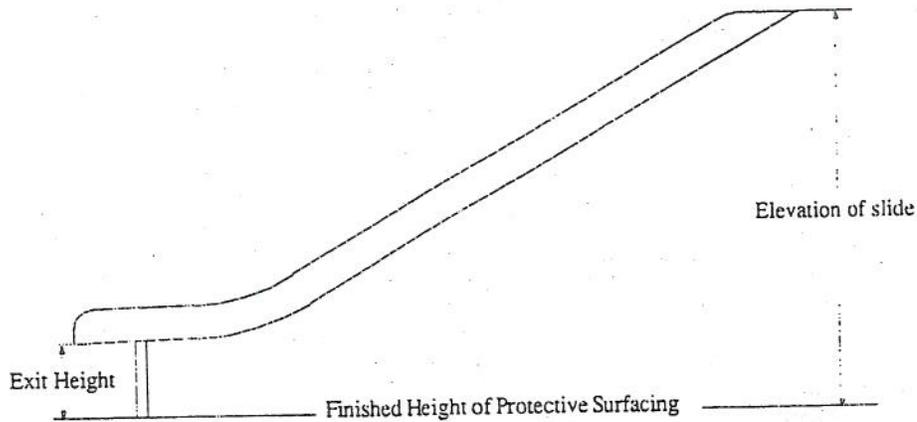


FIG. A1.20 Height of Slide Exit Region

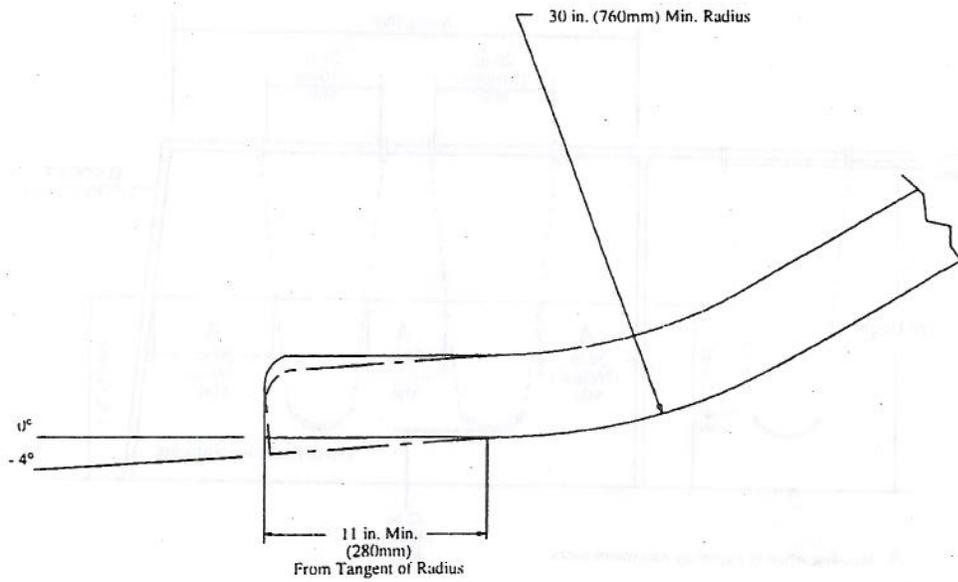


FIG. A1.21 Slide Exit Requirements

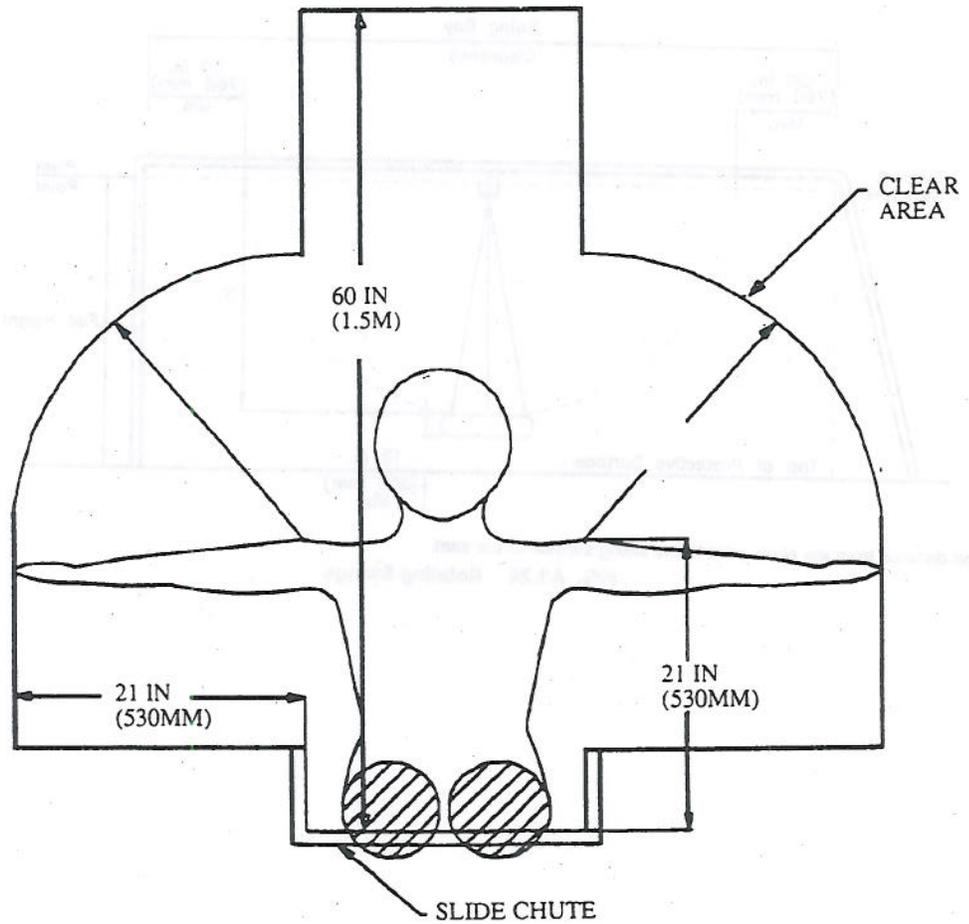


FIG. A1.22 Slide Clearance

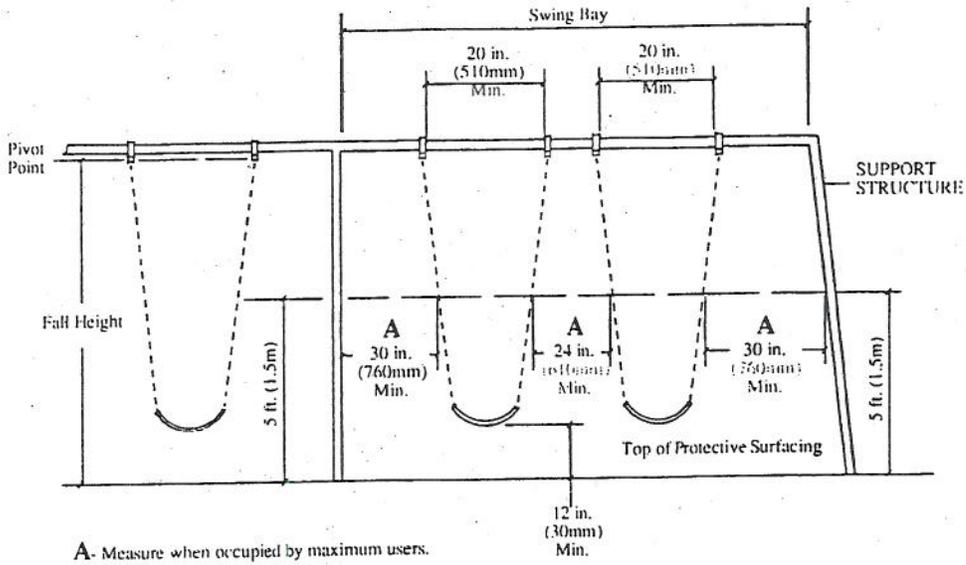
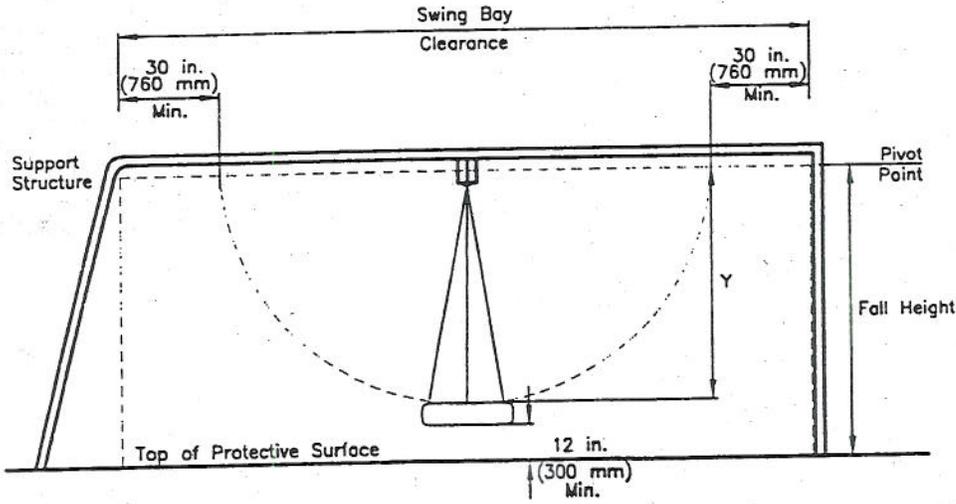
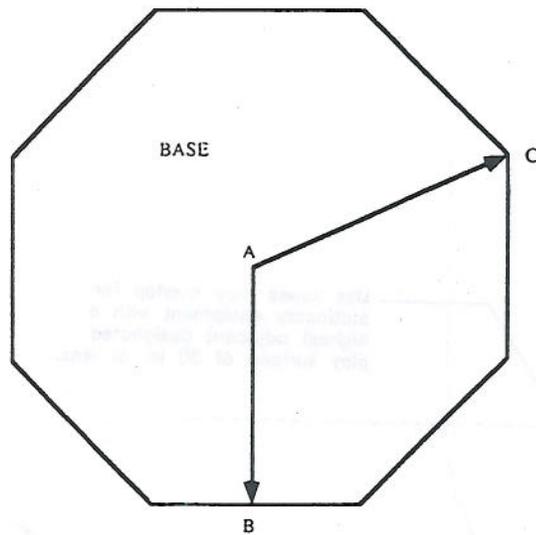


FIG. A1.23 To/Fro Swings



NOTE—Y = the vertical distance from the pivot point to the sitting surface of the seat.

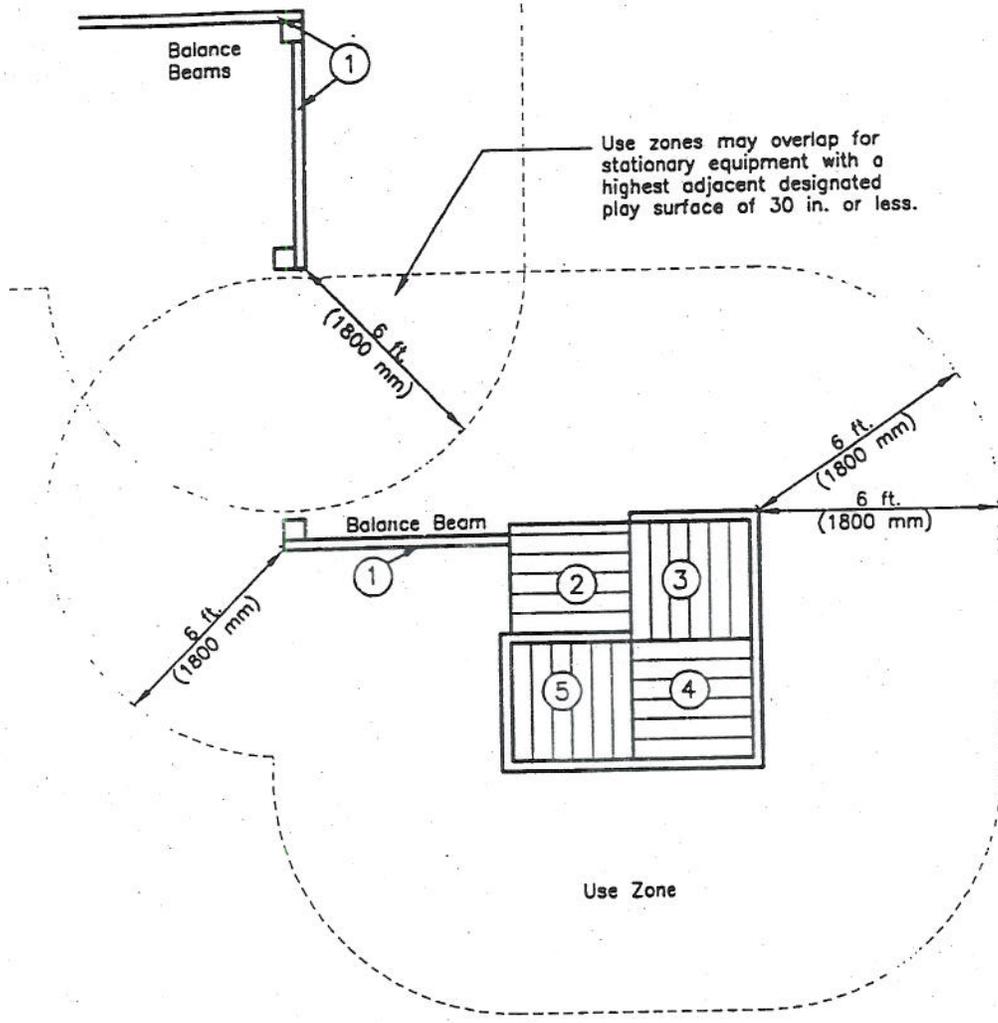
FIG. A1.24 Rotating Swings



A - Axis of Rotation
AB - Minimum Radius
AC - Maximum Radius

The difference between dimension AC and AB should not exceed 2.0 inches (50mm).

FIG. A1.25 Minimum and Maximum Radii of Noncircular Merry-Go-Round Platform



○ Denotes the height of the designated play surface in feet.

FIG. A1.26 Use Zones for Stationary Equipment

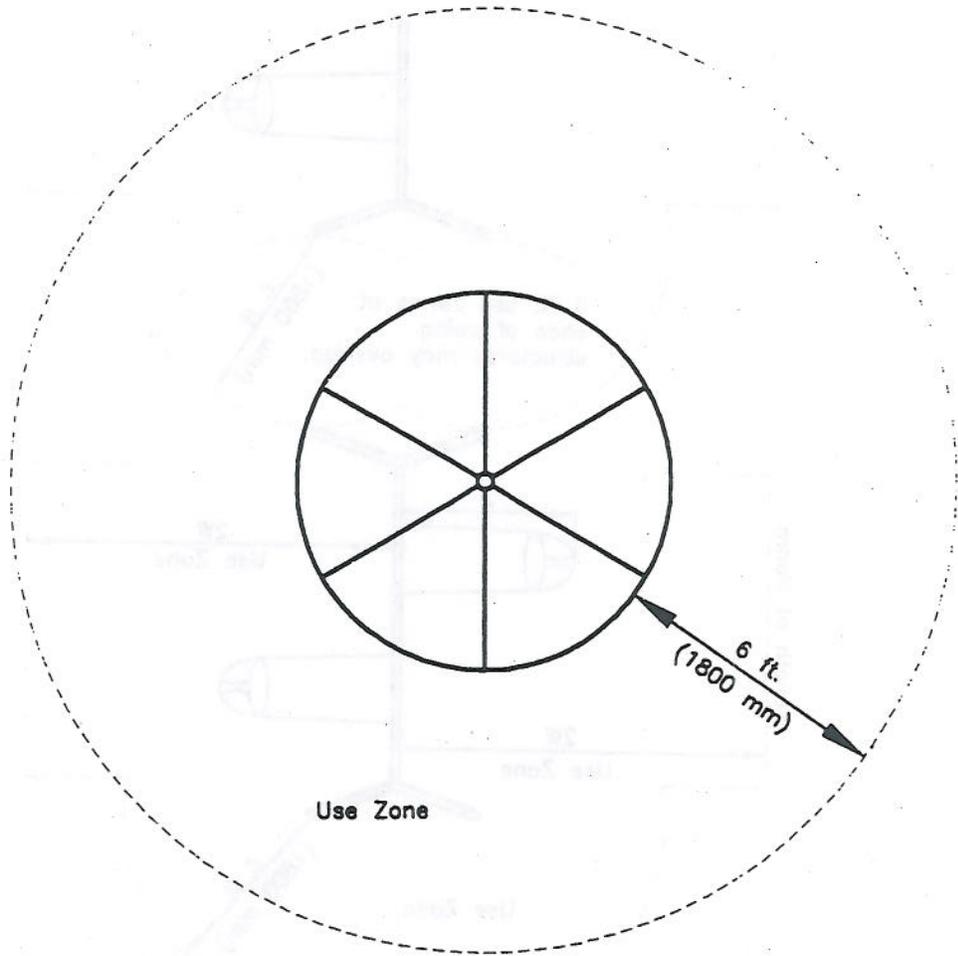
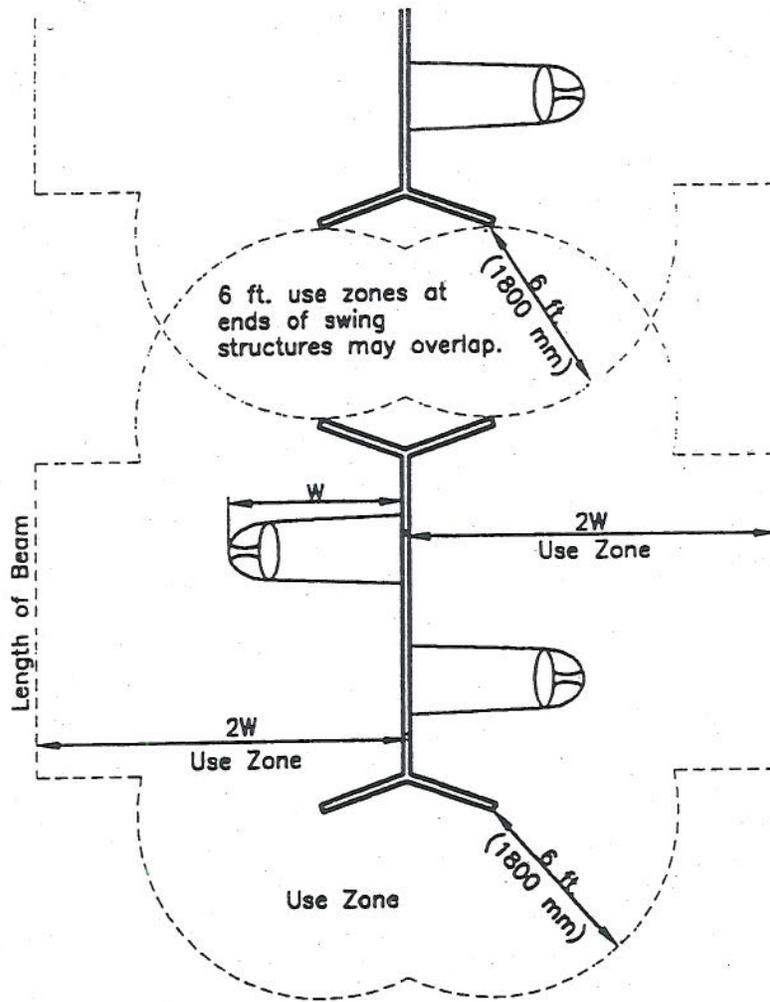
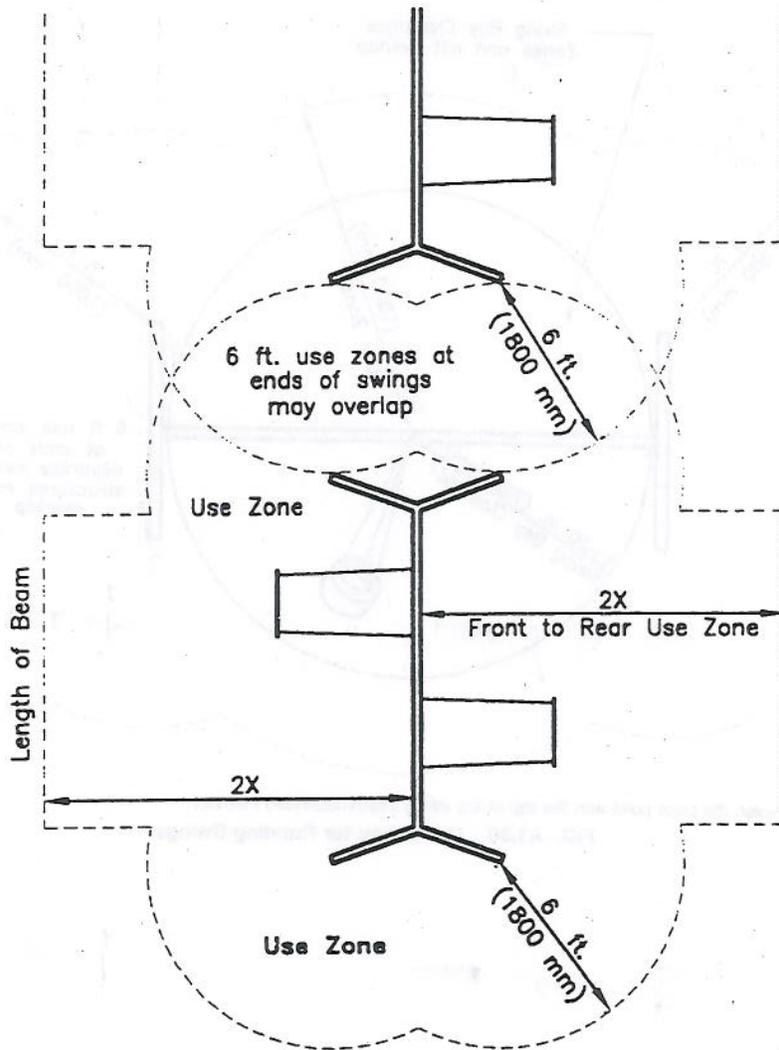


FIG. A1.27 Use Zones for Rotating Equipment



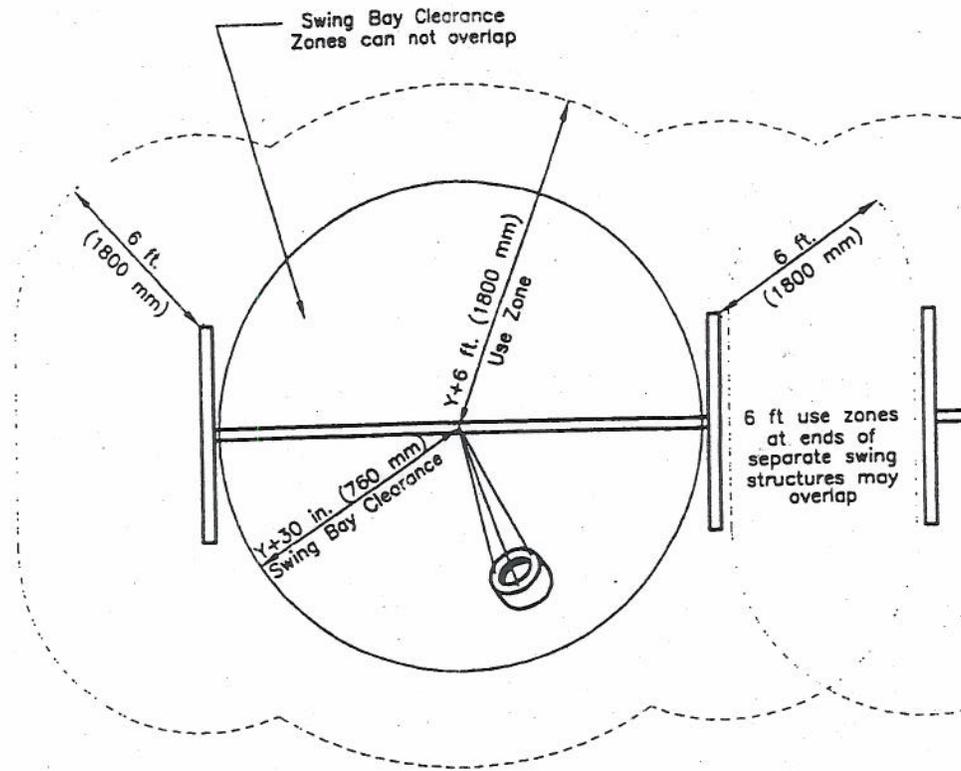
NOTE— W = the vertical distance from the top of the sitting surface to the pivot point.

FIG. A1.28 Use Zones for To-Fro Swings with Enclosed Swing Seats



NOTE—X = vertical distance from the protective surface to the pivot point of the swing.

FIG. A1.29 Use Zones for To-Fro Swings



NOTE—Y = vertical distance between the pivot point and the top of the swing seat/suspended member.

FIG. A1.30 Use Zones for Rotating Swings

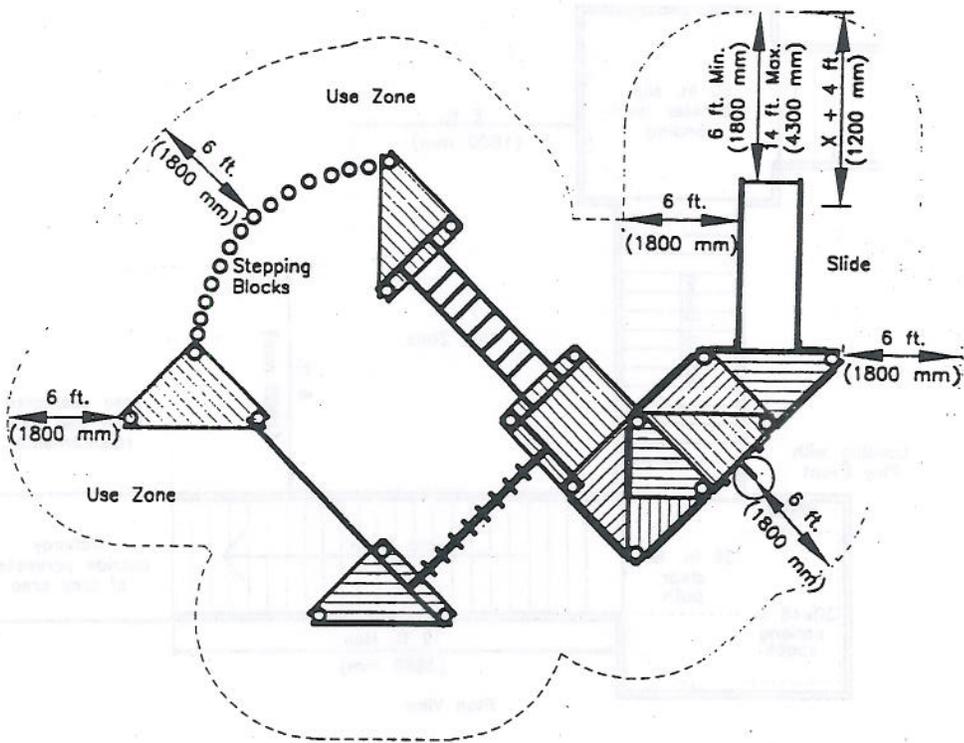


FIG. A1.33 Composite Play Structure

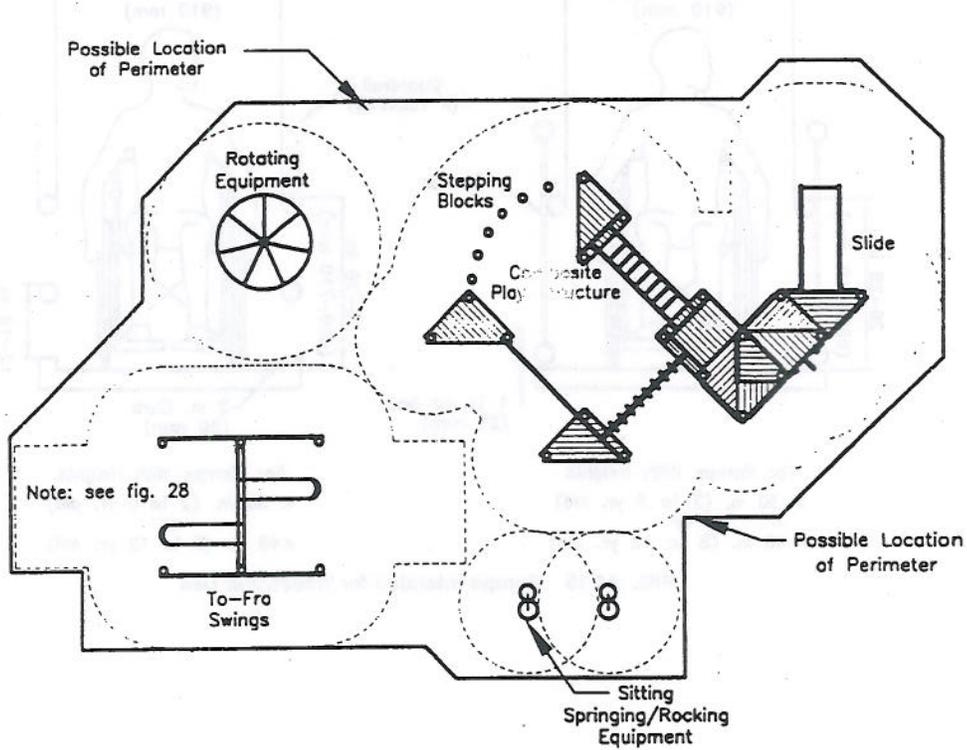
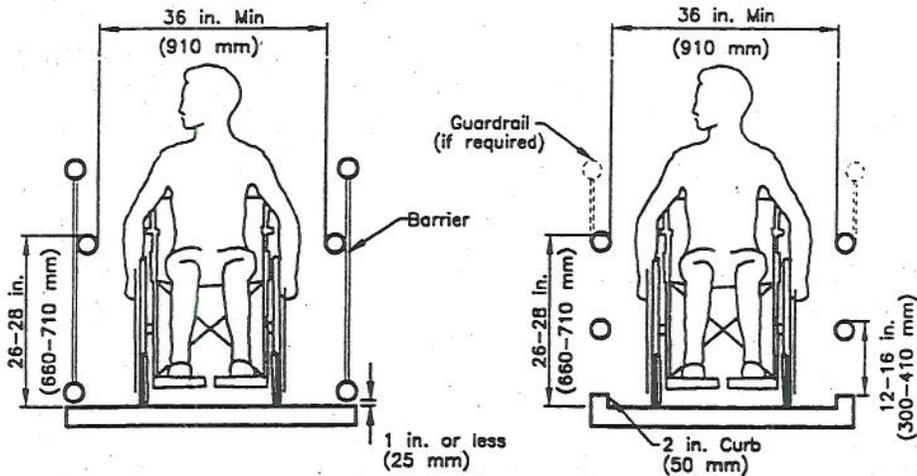
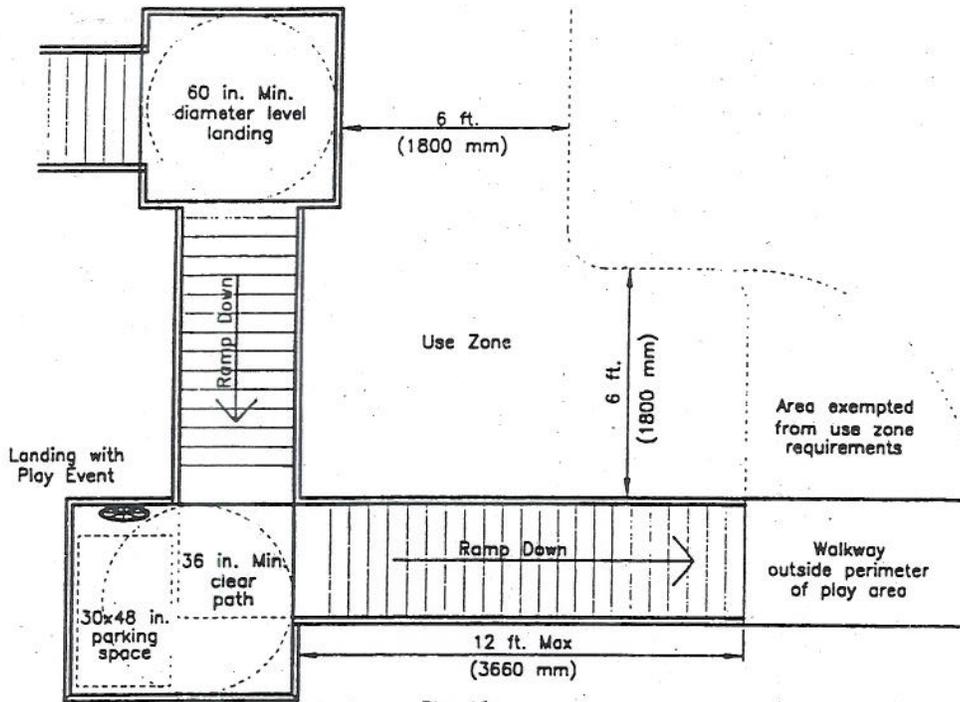


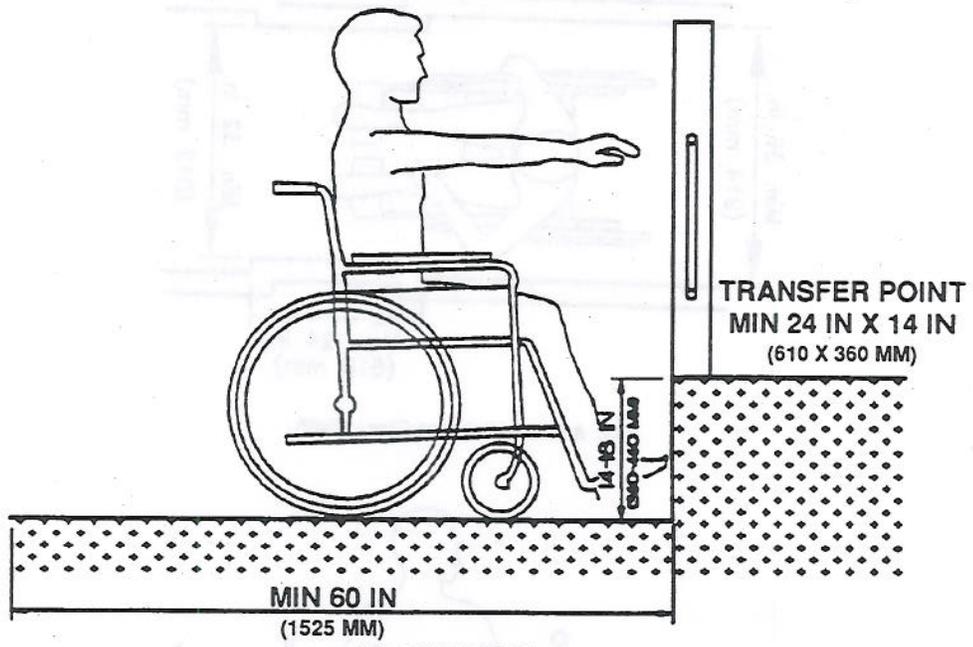
FIG. A1.34 Placement of Equipment



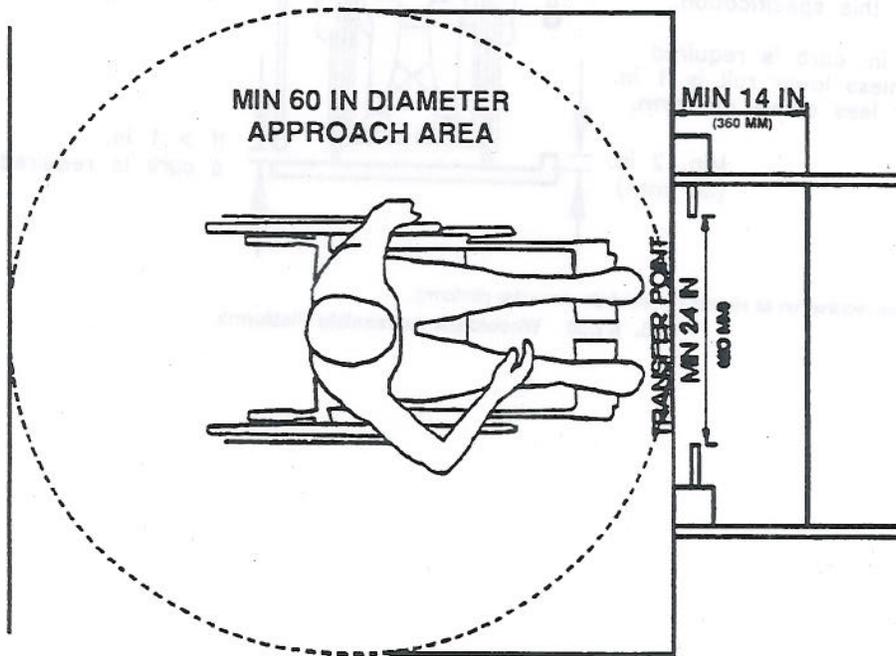
For Ramps With Heights
 > 30 in. (2 to 5 yr. old)
 or
 > 48 in. (5 to 12 yr. old)

For Ramps With Heights
 < 30 in. (2 to 5 yr. old)
 or
 < 48 in. (5 to 12 yr. old)

FIG. A1.35 Ramps Intended for Wheelchair Use



ELEVATION



PLAN VIEW

FIG. A1.36 Transfer Points

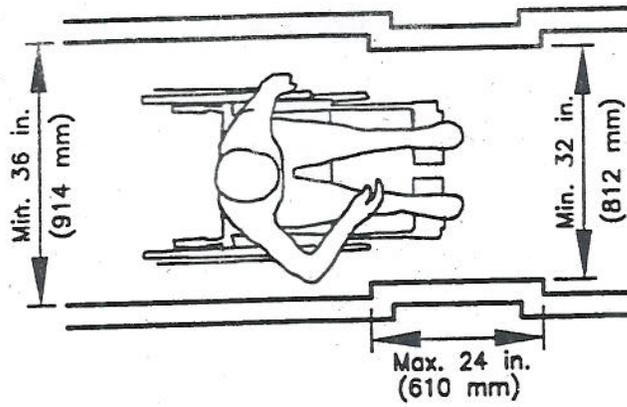
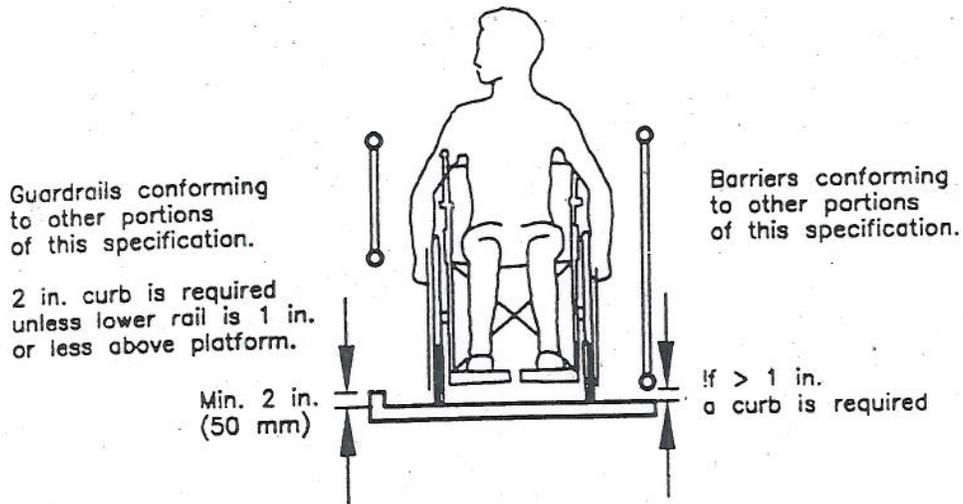


FIG. A1.37 Minimum Clear Width



NOTE—Guardrails or barriers required on all elevated wheelchair accessible platforms.

FIG. A1.38 Wheelchair Accessible Platforms

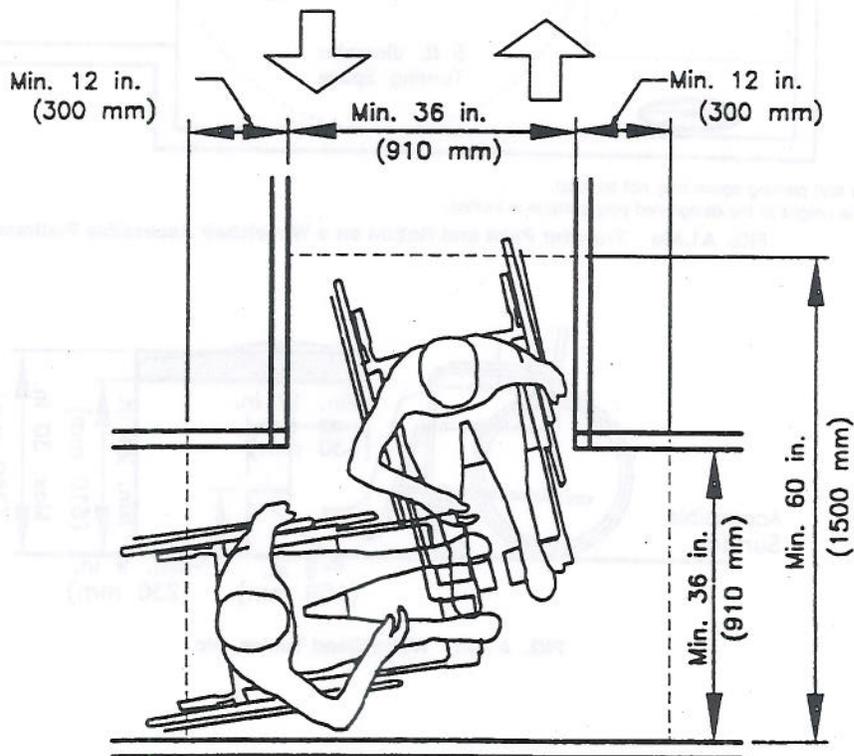
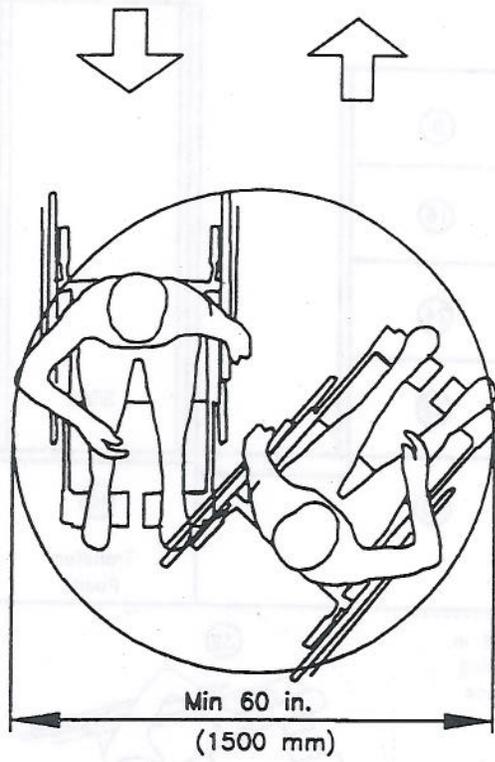
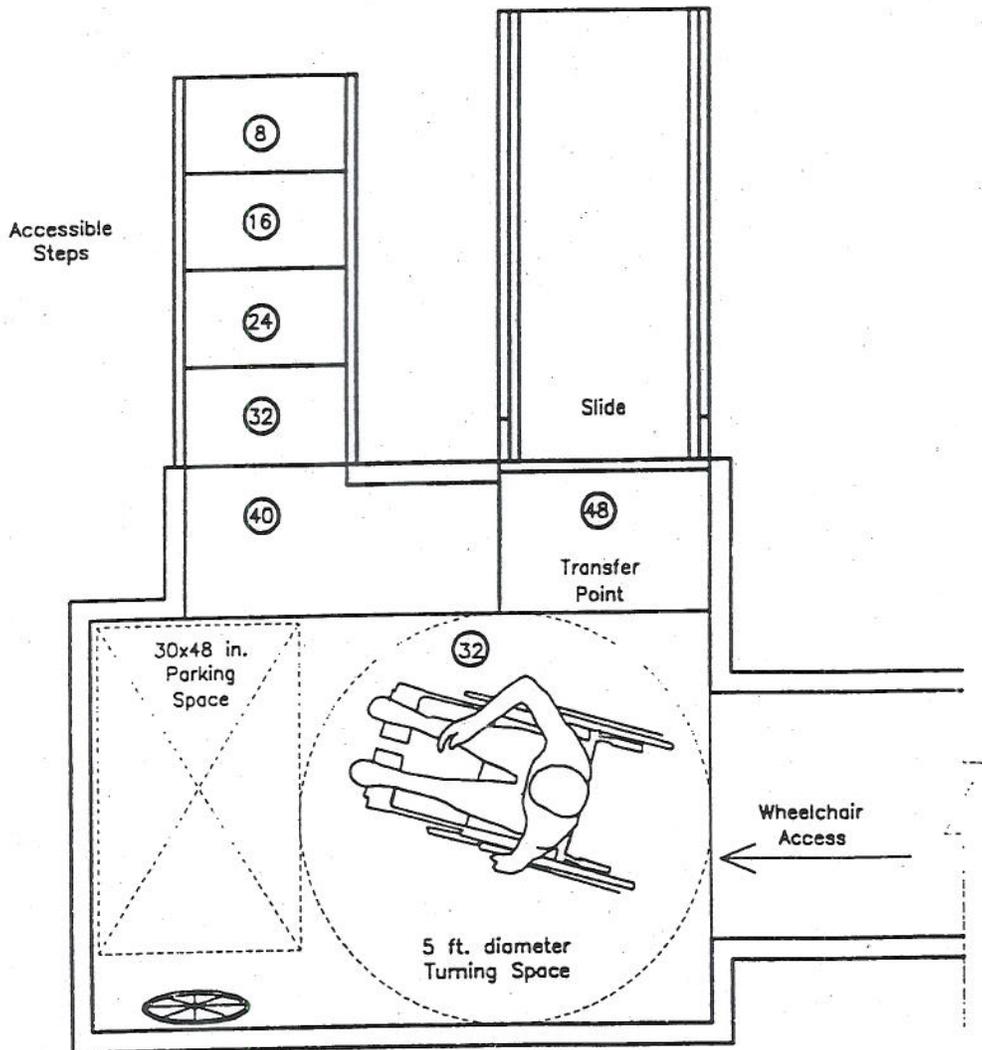


FIG. A1.39 Turning Space



NOTE 1—Turning space and parking space may not overlap.
 NOTE 2—Ⓢ denotes the height of the designated play surface in inches.

FIG. A1.39a Transfer Point and Return on a Wheelchair Accessible Platform

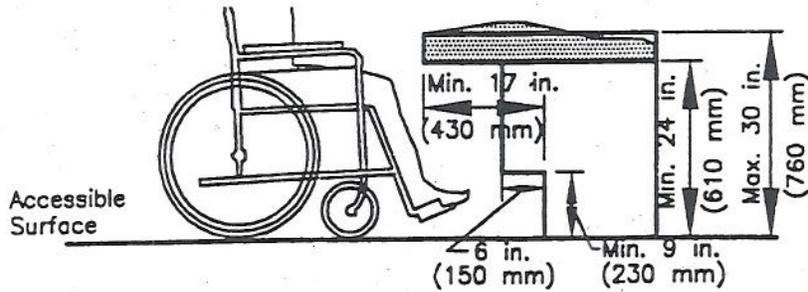


FIG. A1.40 Water/Sand Tables, etc.

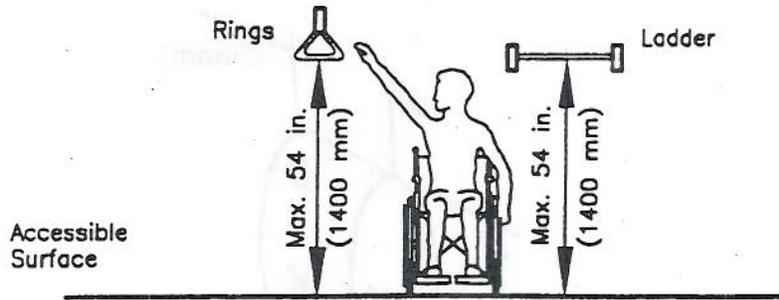


FIG. A1.41 Horizontal Rings and Ladders, etc.

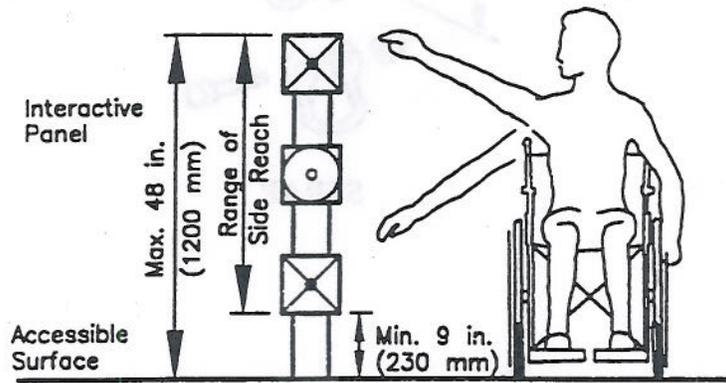


FIG. A1.42 Side Reach Range

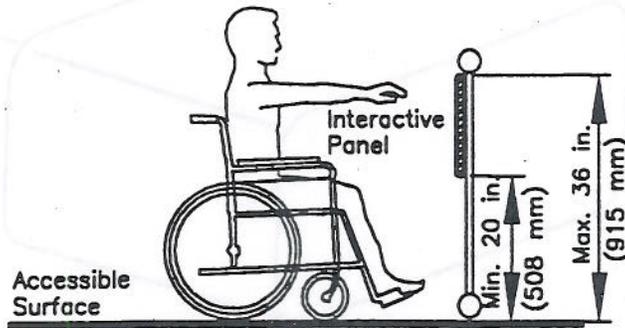
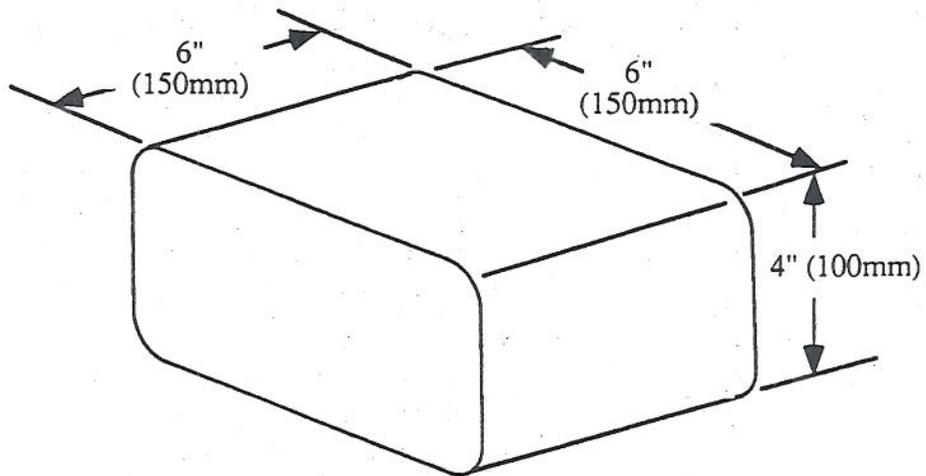
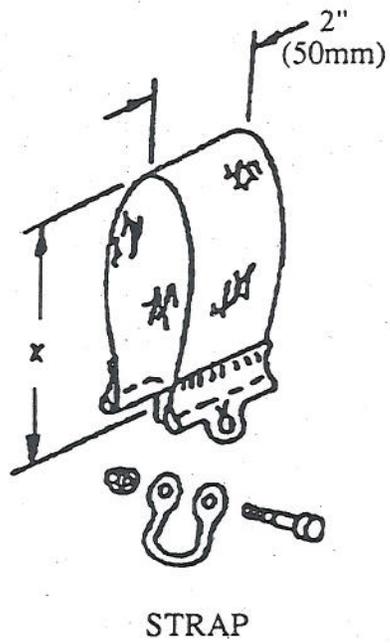


FIG. A1.43 Front Reach Range



NOTE 1—Block made of any rigid material.
NOTE 2—Vary dimension X as required.

FIG. A1.44 Load Distribution Devices

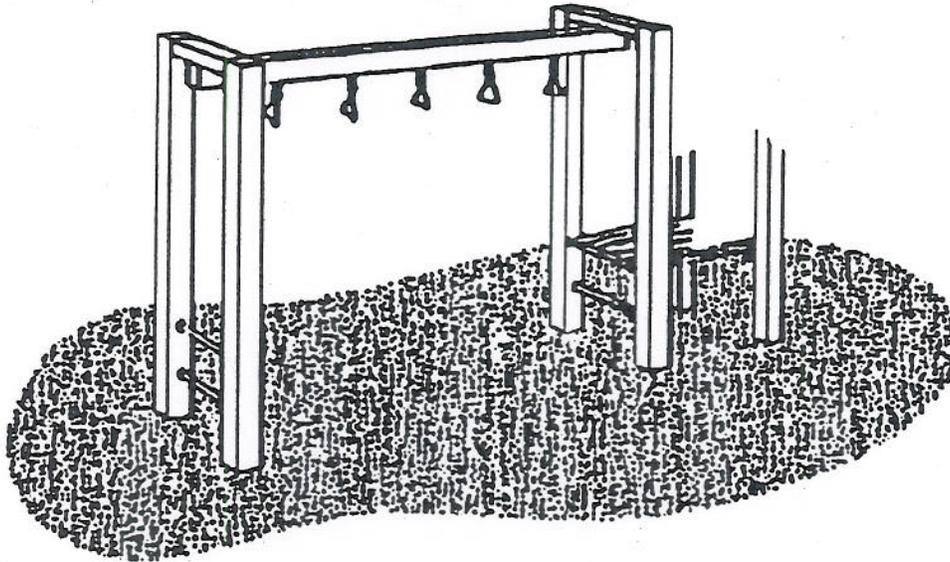


FIG. A1.45 Example of Ring Ladder

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