



Designation: F2376 – 08

Standard Practice for Classification, Design, Manufacture, Construction, and Operation of Water Slide Systems¹

This standard is issued under the fixed designation F2376; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice applies to the classification, design, manufacture, construction, and operation of water slide systems. Water slide systems shall be defined as rides intended for use by riders in bathing attire where the action of the ride involves possible and purposeful immersion of the rider's body either in whole or in part in water, and uses circulating water to mobilize or lubricate the rider's transportation along a purpose built path. This includes slides used with or without vehicles as defined below. The terms water slides, waterslides, and slides shall be considered equivalent when used in this practice.

1.2 For the purposes of this practice, a water slide system includes:

- 1.2.1 The flume,
- 1.2.2 The water-circulation system,
- 1.2.3 The starting platform with associated means of access and egress,
- 1.2.4 The structural supports,
- 1.2.5 Vehicles or other aquatic accessories that are part of the water slide as defined by the manufacturer, and
- 1.2.6 Means of slide termination.

1.3 This practice shall not apply to:

- 1.3.1 Any water slides installed in private residences,
- 1.3.2 Water flume amusement rides where contact with water is merely incidental (for example, log flume rides, shoot-the-chutes),
- 1.3.3 Amusement rides and devices whose design criteria are specifically addressed in another ASTM standard,
- 1.3.4 Lazy river type attractions operating at constant elevation, constructed in the ground, and

1.4 Pre-existing designs manufactured after the effective date of publication of this practice if the design is service proven or previously compliant, as defined in Section 3.1.26 of Practice F2291, and the manufacturer provides:

1.4.1 A historical summary of the water slide, or major modification as defined in Terminology F747, and

1.4.2 A statement that the design is service proven or previously compliant. Water slides and major modifications to water slides may qualify as previously compliant for five years following the date of publication of this practice. Thereafter, water slides and major modifications to water slides must qualify as service proven or meet the requirements of this practice.

1.4.3 Service proven or previously compliant designs shall comply with Section 8.

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 = 4.4482 N.

1.6 This practice includes an Appendix, which provides additional information to enhance the user's understanding of and application of the criteria presented in this practice, for example, rationale, background, drawings, interpretation, or commentary. The information in the Appendix shall not be considered a mandatory part of this practice.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

- 2.1 *ASTM Standards*:²
 - D570 Test Method for Water Absorption of Plastics
 - D638 Test Method for Tensile Properties of Plastics
 - D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
 - F698 Specification for Physical Information to be Provided

¹ This practice is under the jurisdiction of ASTM Committee F24 on Amusement Rides and Devices and is the direct responsibility of Subcommittee F24.70 on Water Related Amusement Rides and Devices.

Current edition approved March 1, 2008. Published April 2008. Originally approved in 2006. Last previous edition approved in 2007 as F2376 – 07. DOI: 10.1520/F2376-08.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- for Amusement Rides and Devices (Withdrawn 2009)³
F747 Terminology Relating to Amusement Rides and Devices
F770 Practice for Ownership, Operation, Maintenance, and Inspection of Amusement Rides and Devices
F846 Guide for Testing Performance of Amusement Rides and Devices
F853 Practice for Maintenance Procedures for Amusement Rides and Devices
F893 Guide for Auditing Amusement Rides and Devices
F1193 Practice for Quality, Manufacture, and Construction of Amusement Rides and Devices
F1305 Guide for Classification of Amusement Ride and Device Related Injuries and Illnesses (Withdrawn 2011)³
F2291 Practice for Design of Amusement Rides and Devices
 2.2 *ACI Standard*:⁴
ACI-318 Building Code Requirements for Structural Concrete
 2.3 *ASCE Standard*:⁵
ANSI/ASCE 7 Minimum Design Loads for Buildings and Other Structures
 2.4 *USDA Document*:⁶
USDA-72 The Wood Handbook

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

- 3.1.1 *landing pool*—pool intended to receive riders from a water slide.
 3.1.2 *landing zone*—area in a landing pool intended for receiving riders from a particular slide.
 3.1.3 *lifeguard*—individual specially trained in lifesaving and emergency procedures, responsible for monitoring patrons and responding to aquatic and other emergencies.
 3.1.4 *owner/operator*—person or organization that is responsible for the maintenance and operation of a water slide system.

4. Slide Classification

4.1 Water slides are classified by their physical and intended use characteristics. The classification may be a combination of the specific rider vehicle used the type of geometric path, often serpentine or straight, and the designation as a speed slide if the rider's velocity exceeds 25 ft/s. The following are definitions of the types of water slides.

- 4.1.1 *body slides*—water slide used without a vehicle.
 4.1.2 *children's slides*—Water slides generally intended only for use by persons under the height of 48 in. Water slide has a maximum fall distance of 3 in. from slide exit where the rider enters the water and water depth is no greater than 24 in.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from American Concrete Institute (ACI), P.O. Box 9094, Farmington Hills, MI 48333.

⁵ Available from The American Society of Civil Engineers (ASCE), 1801 Alexander Bell Dr., Reston, VA 20191.

⁶ Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401.

4.1.3 *mat slides*—water slide used with a designated mat as a vehicle.

4.1.4 *serpentine slide*—curved path as viewed in geometric slide path.

4.1.5 *specialty slides*—proprietary water slide design, such as an uphill, half-pipe, or bowl ride, which does not conform to standard classification.

4.1.6 *specialty vehicle slides*—water slide used with a proprietary vehicle specified by the manufacturer.

4.1.7 *speed slide*—water slide where the rider(s) achieve a velocity of 25 ft/s or more during the course of the ride.

4.1.8 *tube slides*—water slide used with a single or multi-person water slide tube.

5. Materials

5.1 *Flume Material*—Any material that has the following basic properties and that meets all other requirements of this practice may be used to construct water slides.

5.1.1 Flumes riding surfaces shall be constructed to be smooth.

5.1.2 Flume material shall be demonstrated as strong enough to support specified loads as defined in Section 8.

5.1.3 Flume components, maintained using the manufacturer's instructions, shall not deteriorate over time in such a way that a hazard will develop.

5.2 *Support Materials*—Any material that has the following basic properties and that meets all other requirements of this practice may be used to construct water slide supports.

5.2.1 Supports for water slides shall be constructed from durable materials such as wood, metal, concrete, or engineered composites.

5.2.2 Supports for water slides fabricated from metal shall be either inherently corrosion resistant, or be finished in such a way as to provide protection from corrosion.

5.2.3 Wood materials shall be finished in such a way to provide protection against deterioration.

5.2.4 Support material shall be demonstrated as strong enough to support specified loads as defined in Section 7.

5.2.5 Supports shall be constructed to accommodate regular inspection and maintenance for structural integrity, material deterioration, or corrosion, or a combination thereof.

6. Notification Requirement

6.1 A water slide system shown to comply with this practice shall meet all applicable requirements specified in this practice. Anyone representing compliance with this practice shall keep such essential records as are necessary to document any claim that the requirements within this specification have been met.

6.2 The owner/operator of a water slide shall notify the appropriate manufacturer(s) of any known incident as specified in Guides **F1305** and **F893**.

6.3 The manufacturer shall notify the appropriate owner(s)/operator(s) of similar water slides of an incident that resulted in a serious injury promptly upon the determination by the manufacturer that the incident is significantly repeatable.

6.3.1 Such manufacturer notification shall be a bulletin as specified in Sections 4.1.14.3 through 4.1.14.8 of Practice **F853**.

7. Structural Design of Water Slides

7.1 This section defines the loading and strength criteria that shall be used in the structural engineering of water slide flumes and supporting structures. The strength and stability of the water slide system shall be demonstrated by generally accepted engineering methods certified by a professional engineer.

7.2 *Dead Loads (symbol DL)*—Forces resulting from weight of all components of the ride and includes all loads that do not fluctuate with respect to time.

7.3 *Operational Loads*—Forces from water, riders, or vehicles, or a combination thereof, in the ride under normal operations.

7.3.1 *Water Load (symbol WL)*—In free flowing water slides where water does not collect in pools or streams greater than 2 in. deep, the water load shall be a minimum of 15 lbs/linear ft for every 1000 gal/min of flow. Where the flow is such that water collects in pools or streams greater than 2 in. deep, the actual maximum water load shall be determined and used in calculation, design, or load tests, or a combination thereof.

7.3.2 *Rider Load (symbol RL)*—The manufacturer shall specify the rider vehicle and the maximum number of riders that are to ride in the flume at one time.

7.3.2.1 For water slides intended for multiple rider use, the weight assigned to each rider shall be, at a minimum, the weight specified for an adult rider in Section 8.6.1 of Practice F2291.

7.3.2.2 For single rider water slides, the rider weight shall be a maximum of 300 lb.

7.3.2.3 For water slides intended for use by children only, the weight assigned to a child shall be as specified in Section 8.6.2 of Practice F2291.

7.3.2.4 Ride loads shall be so arranged to cause the greatest realistic operational load to the system.

7.3.2.5 Lateral centripetal forces shall be considered in curved sections of flume. Predicted rider speeds should be used to calculate these forces. If speeds cannot be predicted, then a minimum of 15 ft/s for flumes under 15 % slope and 30 ft/s for all other flumes shall be used.

7.3.2.6 If the manufacturer places maximum rider total weight limits on a slide, then that restricted load may be used.

7.3.2.7 The weight of the rider vehicle shall be included in determining rider load.

7.4 *Environmental Loads*—Forces from environmental conditions of the site such as wind, precipitation, earthquake, and changes in temperature.

7.4.1 Loads and forces due to environmental conditions shall be in accordance with applicable local code requirements or ANSI/ASCE 7, or other equivalent national standard.

7.4.2 The manufacturer/designer shall clearly indicate the environmental loads the water slide was designed for in the operating and maintenance instructions as specified in the sections on Manufacturer's Responsibility of Practices F770 and F853. In addition to the environmental load information, any restriction, limitations, or special procedures associated with water slides exposed to these environmental loads shall be included.

7.4.3 *Lateral Wind Load (symbol LWL)*—For outdoor slides, the minimum wind load for all types of water slides shall be calculated based on 100-mph wind (3-s gust) for non-operational conditions. Lateral wind load may be reduced by an importance factor of less than 1.0, where appropriate, for water slide structures that are unoccupied during extreme weather.

7.4.4 *Reduced Lateral Wind Load (symbol RLWL)*—For outdoor slides, the minimum wind load for all types of water slides shall be calculated based on Section 8.13.1 of Practice F2291 for operational conditions.

7.4.5 *Other Lateral Loads (symbol OLL)*—A minimum lateral load equivalent to 10 % of the dead weight of the structure shall be included.

7.4.6 *Snow Load (symbol SL)*—The snow load for all types of water slides shall be calculated in accordance with the relevant local ground snow load(s).

7.5 *Overload*—Forces from water, riders, or vehicles, or a combination thereof, under extraordinary operational conditions due to user overload.

7.5.1 Calculations for extraordinary operational conditions that consider user overload shall be based on conditions specified by the manufacturer and need not consider any other live load in combination with such overload.

7.6 *Load Combinations*—Engineering calculations may use either allowable stress methods (ASD) or load and resistance factor methods (LRFD). Engineering calculations shall consider load conditions and combinations of loads in accordance with generally accepted engineering methods. Calculations shall consider that water slide systems may not be occupied during extremes of weather.

7.7 *Metal Structures*—Strength of steel structures under or above noted loads shall be designed in accordance with current AISC, ASCE standards,⁵ or equivalent national standards.

7.8 *Wood Structures*—Strength of timber structures under or above noted loads shall be designed in accordance with current USDA-72, ASCE standards,⁵ or equivalent national standards.

7.9 *Concrete Structures*—Strength of concrete structures under above noted loads shall be designed in accordance with current ACI-318 or equivalent national standards.

7.10 *Plastic and Plastic Composite Structures:*

7.10.1 Strength of plastic structures under above noted loads shall be designed in accordance with generally accepted engineering methods. Assessment shall be performed in a manner suitable for the specific material and structure.

7.10.2 Fiberglass reinforced plastic or other composite materials used structurally shall have samples tested for strength with accelerated aging in accordance with Test Methods D570, D638, and D790.

7.10.3 Loads from normal operational conditions shall demonstrate a minimum of 5 to 1 factor of safety against rupture for fiberglass reinforced plastic or other composite materials.

7.10.4 Calculations for extraordinary operational conditions from user overload shall demonstrate a minimum of 2 to 1 factor of safety against rupture of fiberglass reinforced plastic or other composite materials.

8. Performance Requirements

8.1 General Requirements:

8.1.1 The following are minimum requirements and should not be substituted where manufacturer experience suggests more acrimonious values.

8.1.2 Surfaces in reach by slide attendants and riders shall be made in such a way as to reduce the potential for injury.

8.1.3 A water slide shall be designed and constructed so that forces on riders allow the rider to use the slide in accordance with the rules and instructions under normal operating conditions.

8.2 Slide Access:

8.2.1 *General*—Fencing, guardrails, and handrails shall be installed in accordance with Section 14 of Practice F2291.

8.2.2 If the water slide system includes a starting platform and the platform is more than 21 in. above surrounding terrain, the platform shall provide at least 36 in. in distance between the slide entry and the top of stairs or ramp. Sufficient space shall be provided on the platform for slide attendant workspace, signage, and any communication devices needed for operation. Except where a stair or ramp or slide entry joins it, the platform shall be surrounded on all sides by a guardrail in accordance with Section 14 of Practice F2291.

8.2.3 Surface of steps, access ramp, and deck shall be slip-resistant and self-draining.

8.2.4 Slide entry section should interface with the platform guardrail so that a 4 in. sphere cannot pass between the slide entry component and the adjacent guardrail component.

8.3 Open Flume Geometry:

8.3.1 Flume cross-section shape shall be configured to contain the rider(s) or vehicle, or both, under all reasonable operating conditions. Total depth of section and shape of cross-section of a flume may be created in a single piece or more than one piece.

8.3.2 Open water slide flumes shall be kept clear of obstacles within the water slide clearance envelope as shown in Figs. 1 and 2. Flume riser sections may be added to block access to anything encroaching in the area.

8.3.3 Water slides shall have additional sidewall height provided by a flume riser section on the outside part of all horizontal curves to contain the rider. This flume riser shall be concave facing the center of the cross-section. The flume riser may be an integral or separate part from the main flume component.

8.3.3.1 *Flume Riser Transition*—Flume riser parts shall be transitioned from sections without flume risers to sections with flume risers with a maximum angle of 45° from the horizontal. See Fig. 3.

8.3.3.2 *Other Additions*—Where a cover, a tube entrance, or a flume riser is fitted other than at the beginning of the slide, the sides of the slide shall have a smooth transition from horizontal to vertical. Maximum angle of transition will be 45°. The inside height of the entrance to the cover or flume riser shall be at least 48 in.

8.3.4 Body slides with curved bottom flume sections such that the cross-section of the bottom and the sides are a continuously curving surface shall have:

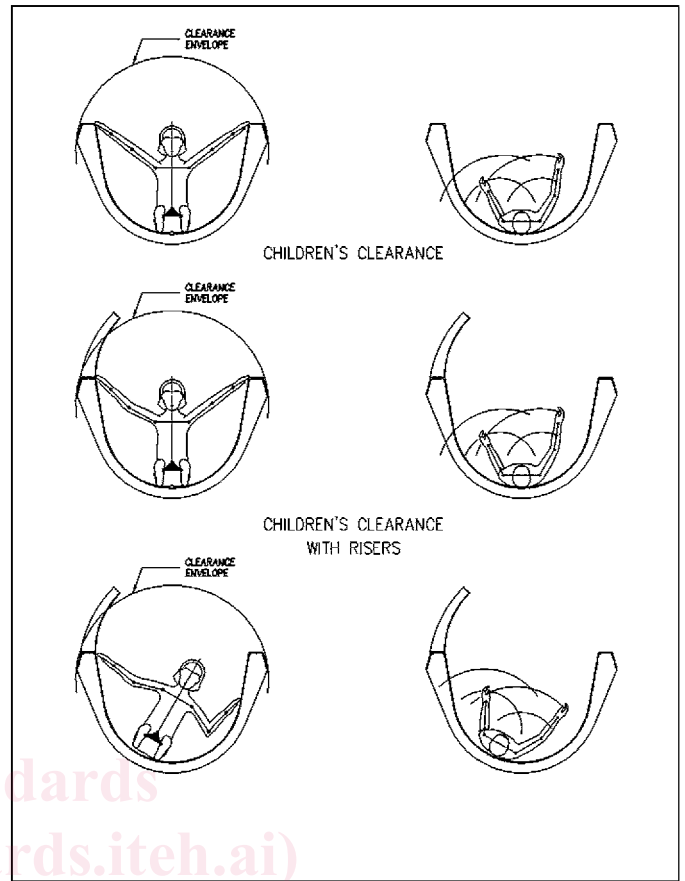


FIG. 1 Water Slide Clearance Envelope

8.3.4.1 Minimum inside width of 30 in., minimum sidewall height of 15 in., and

8.3.4.2 The top 1 in. of curved sidewalls shall be within 10° of vertical.

8.3.5 Tube slides with flat bottom flume sections shall have:

8.3.5.1 Minimum width of 48 in. inside sidewalls,

8.3.5.2 Minimum sidewall height of 24 in., and

8.3.5.3 Sidewalls that are straight may diverge from vertical a maximum of 2 in. measured at 24 in. from bottom.

8.3.6 Tube slides with curved bottom flume sections such that the cross-section of the bottom and the sides are a continuously curving surface shall have:

8.3.6.1 Minimum inside width of 52 in.,

8.3.6.2 Minimum sidewall height of 26 in., and

8.3.6.3 The top 1 in. of curved sidewalls shall be within 10° of vertical.

8.3.7 Mat slides that are straight in plan shall have:

8.3.7.1 Minimum width of 22 in. inside sidewalls,

8.3.7.2 Minimum sidewall height of 16 in.,

8.3.7.3 Sidewalls that are straight may diverge from vertical a maximum of 6 in. measured at 16 in. from bottom, and

8.3.7.4 The top 1 in. of curved sidewalls shall be within 10° of vertical.

8.3.8 *Multiple Parallel Lane Flumes*—Where more than one flume runs in parallel straight-line path (in plan).

8.3.8.1 The outermost sections shall have sidewalls a minimum of 24 in. in height.

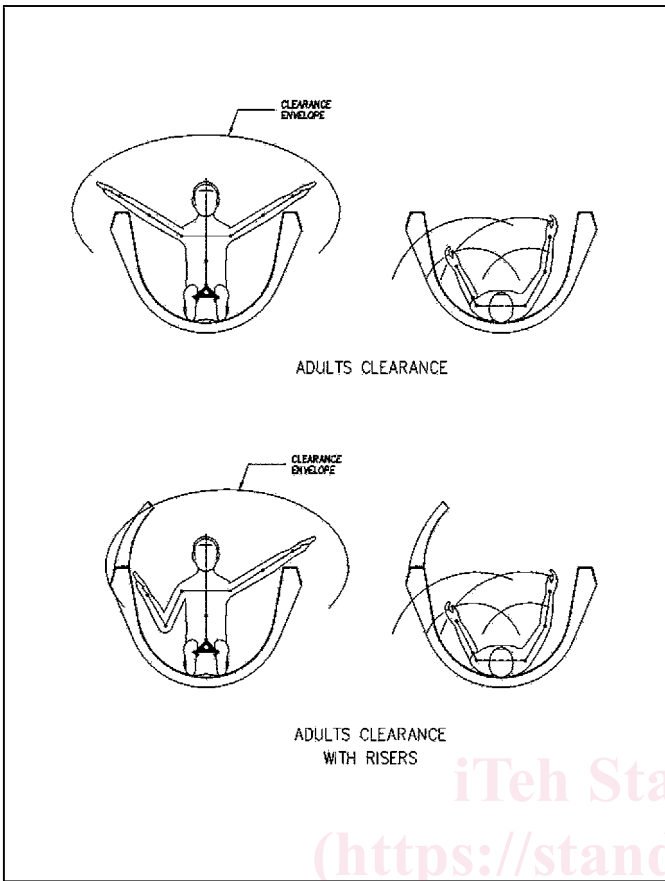


FIG. 2 Water Slide Clearance Envelope

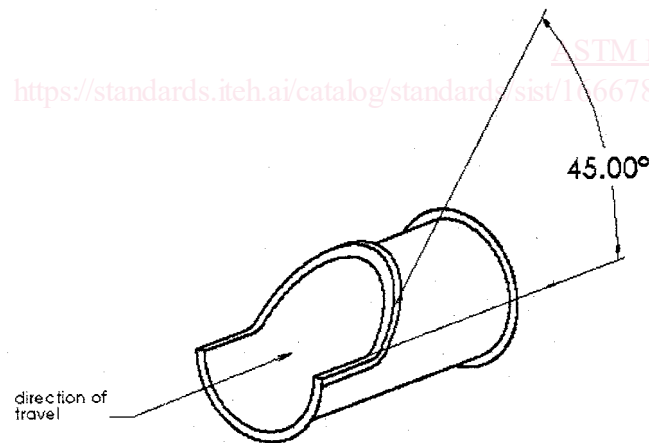


FIG. 3 Flume Riser

8.3.8.2 Where the flume path runs adjacent, there shall be a dividing barrier a minimum of 8 in. high between the lanes.

8.3.8.3 Each lane shall be a minimum of 22 in. inside width.

8.3.9 Water slides such as specialty slides that cannot be classified above shall conform to the requirements of 9.4.

8.3.10 Combination rides may be designed such that sections of the slide conform to the requirements of the respective specifications above.

8.4 *Closed Flume Geometry:*

8.4.1 The following are minimum requirements and should not be substituted where manufacturer experience suggests more conservative values. Total shape of cross-section of a flume may be created in two or more pieces.

8.4.2 Body slides with curved bottom flumes shall have a minimum inside dimension of 30 in.

8.4.3 Tube slides with flat bottom closed flume sections shall have a minimum inside dimension of 48 in.

8.4.4 Tube slides with curved bottom closed flume sections shall have a minimum inside dimension of 52 in.

8.5 *Flow Rate*—The water flow in each slide has an effect on the performance of the sliding surface.

8.5.1 The manufacturer shall determine the flow rate and shall set a fixed range of acceptability for each installation at the time of commissioning.

8.5.2 The water flow valves shall be secured from interference or adjustment by unauthorized personnel.

8.5.3 Flow meters, calibrated means of flow measurement, or marker(s) indicating proper operational water flow/level shall be provided for each flume.

8.6 *Run Out Lanes:*

8.6.1 Run out sections shall be designed to contain, decelerate, and stop riders to allow them to exit the slide.

8.6.2 A weir or other device shall regulate the water level in the run out to the correct level given correct flow rate for the ride.

8.6.3 To facilitate proper deceleration, a marker shall be provided to indicate the operational water level in the run out, which the slide attendant/lifeguard may verify prior to allowing the next rider entry to the slide.

8.7 *Landing Pools:*

8.7.1 Landing pools shall be designed to decelerate and stop riders and allow them to exit the water slide without encountering an obstruction.

8.7.2 The exit path for riders shall not cross with the landing zone of other slides. The designated pool exit shall be such as to force the riders to move forward and away from the paths of riders from other flumes.

8.7.3 Water slides entering a landing pool shall have a landing pool of sufficient length to decelerate and stop riders and minimize the potential for contact with the pool wall or stationary objects (stair, ladder, railing, and so forth) in the landing pool. Water slides classified as speed slides (rider velocity over 25 ft/s) will require additional pool length.

8.7.4 Pool depth in the landing zone for water slides for persons over 48 in. tall shall have a minimum pool depth of 3 ft.

8.7.5 Flume geometry at pool entry shall be straight viewed in plan for the last 8 ft of the water slide entering a pool.

8.7.6 Landing pools for waterslides with a fall distance greater than 6 in. shall have an increase in pool depth from the 3 ft minimum according to manufacturer recommendation to minimize potential impact with pool bottom.

8.7.7 If water supply for the slide(s) is drawn directly from landing pools or other areas accessible to the public, the suction line shall be divided into at least two lines, where connected to the pool, such that one person cannot block more

than one suction line. The fittings and piping details shall be designed so that the full volume of water for the slide may be drawn through the remaining fittings at a velocity not to exceed 1 ft/s, assuming one suction fitting is fully blocked.

8.7.8 *Body Slide Landing Pools:*

8.7.8.1 Body slides entering a landing pool shall have a minimum distance between the inside of the widest part of the flume riding surface and the closest pool wall of 5 ft. The place of measurement in the pool shall be at any point from water level to 3 ft below water level and 6 ft in front of the flume termination. The lateral pool wall shall be parallel to or diverge from the axis of the slide. See Fig. 4.

8.7.8.2 Body slides entering a common landing pool should be arranged so riders do not come in contact with each other when exiting the flumes of adjacent slides simultaneously.

8.7.9 *Tube Slide Landing Pools:*

8.7.9.1 Tube slides entering a landing pool shall have a minimum distance between the inside of the widest part of the flume riding surface and the closest pool wall of 4.5 ft. The place of measurement in the pool shall be at any point from water level to 3 ft below water level and 6 ft in front of the flume termination. The pool wall shall be parallel to or diverge from the axis of the slide. See Fig. 4.

8.7.9.2 Tube slides entering a common landing pool should be arranged to minimize the opportunity for contact with other riders when exiting the flumes of adjacent slides simultaneously.

8.8 *Openings and Apertures in Flume Surfaces:*

8.8.1 Openings may be provided in flume surfaces for introduction of water, drains, special effects, light, and other similar purposes. All edges in openings within reach of riders shall be smooth with a minimum radius of 1/8 in. Openings shall not present an entrapment risk.

8.8.2 Openings at the slide start for the main water supply do not require guards or gratings unless the rider stands, sits, walks, or slides over the face of the opening during normal slide operation, or if the configuration of the opening is such that a rider moving in the usual direction of travel would not become entrapped. Grating shall have a maximum width of slot or hole diameter of 1/2 in.

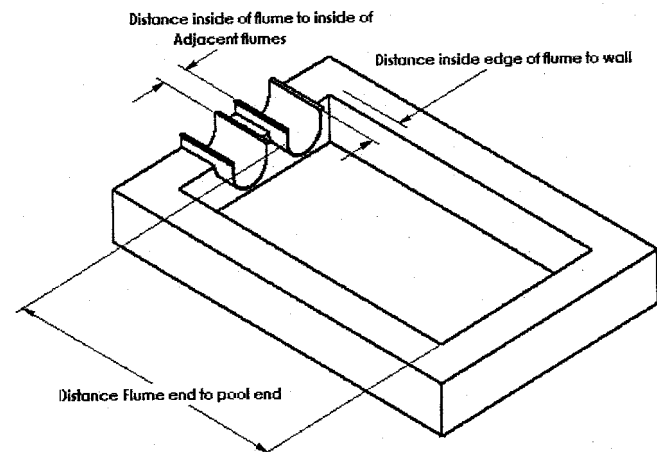


FIG. 4 Body Slide Landing Pool

8.9 *Seams and Joints:*

8.9.1 The surface of the sliding section shall form a smooth, secure, and continuous surface. If adjacent edges of lateral joints are not perfectly tangent, the upstream edge shall be set above the downstream edge on the riding surface a maximum of 3/16 in. to ensure that riders will not hit the edge of a lateral joint. (For the purposes of this section, riding surface shall be taken to mean the part of the flume where the path of riders is expected or found to pass over, for example, the outside half of a curved flume section.)

8.9.2 Longitudinal joints on the riding surface shall be made tangent.

8.9.3 Edges of lateral joints on body slides may have a radius of up to 3/16 in. Edges of longitudinal joints in closed flumes may have a radius of up to 1/4 in. Edges of longitudinal joints in open flume risers may have a radius of up to 3/8 in.

8.9.4 Edges of lateral joints on mat and tube slides may have a radius of up to 1/2 in.

8.10 *Accelerations:*

8.10.1 Slide paths shall be designed so riders in seated or prone (laying face down) positions do not experience greater than 2 Gs acceleration from gravity and centrifugal acceleration vectors added together. This limit may be increased to 3 Gs if the duration is less than 1 s.

8.10.2 Slide paths shall be designed so that riders in supine (laying face up) positions do not experience greater than 3 Gs acceleration from gravity and centripetal acceleration vectors added together.

8.11 *Slide Vehicles:*

8.11.1 Slide vehicle(s), if specifically required by the manufacturer, shall be utilized.

8.11.2 Alternative slide vehicles shall be approved for use on water slides in writing from the manufacturer prior to guest use.

8.11.3 In the event the manufacturer does not provide written documentation of approval for an alternative slide vehicle, testing shall be performed and documented to determine if the proposed alternative vehicle is acceptable as outlined in Section 9.

8.11.4 Slide vehicles shall be maintained in operating condition, including but not limited to all handles or other holding devices, and conditions of vehicle surfaces in contact with the slide surface.

8.11.5 Slide vehicles should be removed from service for repair or replacement when components are missing or damage is detected, or both.

8.11.6 Slide vehicles shall be constructed to have a cushioning effect for riders who can come into contact with another vehicle during normal operation of the slide.

8.11.7 Slide vehicles shall float when used in a landing pool.

9. *Test and Inspection Methods*

9.1 The manufacturer of a new slide or major modification to an existing slide shall specify prior to commissioning or re-certification, test or inspection procedures, or both, in compliance with Guide F846 and Practice F1193, including but not limited to the following.