



Designation: F2376 – 23

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

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1. Scope

1.1 This practice applies to the classification, design, manufacture, construction, auditing, major modification, 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.

1.1.1 Owner/operator requirements of this standard are required of all water slide systems regardless of date of construction.

1.1.2 The design, manufacture and construction of an existing water slide or portions of a water slide system unaffected by a major modification shall meet the standard requirements in existence at the time of the construction.

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,

1.3.5 Inflatable water slides (constant air supply) that are mounted on land (refer to Practice F2374-22 for the requirements of these types of water slides),

1.3.6 Inflatable water slides (captured air) that are floating on a body of water (refer to EN/ISO 25649-2017, parts 1 through 7), and

1.3.7 Water slides less than 6 ft tall. (Refer to Practice F2461-20a for the requirements of slides less than 6 ft tall.)

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 Terminology F747-22, and the manufacturer provides:

1.4.1 A historical summary of the water slide, or major modification as defined in Terminology F747-22, 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 4.

1.5 The values stated in inch-pound units are to be regarded as standard. No other units of measurement are included in this standard.

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*

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.

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responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.

1.8 This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

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

F747 Terminology Relating to Amusement Rides and Devices

F770 Practice for Ownership, Operation, Maintenance, and Inspection of Amusement Rides and Devices

F1193 Practice for Quality, Manufacture, and Construction of Amusement Rides and Devices

F2291 Practice for Design of Amusement Rides and Devices

F2374 Practice for Design, Manufacture, Operation, and Maintenance of Inflatable Amusement Devices

F2461 Practice for Manufacture, Construction, Operation, and Maintenance of Aquatic Play Equipment

F2974 Practice for Auditing Amusement Rides and Devices

F3158 Practice for Patron Transportation Conveyors Used with a Water Related Amusement Ride or Device

F3493 Practice for Measuring Dynamic Characteristics of Water Slide Systems Using Instrumented Humans

2.2 ACI Standard:³

ACI-318 Building Code Requirements for Structural Concrete

2.3 ASCE Standard:⁴

ASCE/SEI 7-16 Minimum Design Loads for Buildings and Other Structures

2.4 EN/ISO Standard:⁵

EN/ISO 25649 Floating leisure articles for use on and in the water

2.5 USDA Document:⁶

USDA-72 The Wood Handbook

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

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.

³ Available from American Concrete Institute (ACI), P.O. Box 9094, Farmington Hills, MI 48333.

⁴ Available from The American Society of Civil Engineers (ASCE), 1801 Alexander Bell Dr., Reston, VA 20191.

⁵ Available from International Organization for Standardization (ISO), ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <https://www.iso.org>.

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

3.1.1 *fall distance*—vertical distance between the terminus of the slide surface and the water surface of the landing pool.

3.1.2 *flume riser (splashguard)*—extension of the side wall of an open flume to contain riders or water and is capable of use as a riding surface.

3.1.3 *landing pool*—pool intended to receive riders from a water slide.

3.1.4 *landing zone*—area in a landing pool intended for receiving riders from a particular slide.

3.1.5 *run-out section*—flume surface of a water slide where riders are intended to decelerate or come to a stop, or both.

3.1.6 *slide height*—difference in elevation from the centerline of the flume at the slide exit to the centerline of the flume at slide entry, measured at the riding surface.

3.1.7 *slide path*—geometric layout of the flume sections that make up the water slide.

4. Design

4.1 General Design Criteria:

4.1.1 General design criteria shall be in accordance with Section 5, General Design Criteria, of Practice **F2291-22a** with the following revisions:

4.1.1.1 Exclude Practice **F2291-22a** subsection 5.1.1.4 (2) Patron Restraint and Containment Analysis.

4.1.1.2 Exclude Practice **F2291-22a** subsection 5.1.1.4 (3) Patron Clearance Envelope Analysis.

4.1.1.3 Exclude Practice **F2291-22a** subsection 5.5.2.

4.1.1.4 The coordinate system as defined in Terminology **F747-22** shall be used as the standard reference for acceleration directions.

4.1.1.5 Exclude Practice **F2291-22a** subsection 5.6.4.1.

4.1.1.6 General drawings or diagrams in plan, elevation, and section views showing the general arrangement of components, including slide clearance envelope as described in **4.3**.

4.1.2 The ride analysis shall include assessment and mitigation of potentially hazardous conditions associated with the design rider path and rider path variations.

4.1.3 If systems or devices are used to affect the speed of the rider or ride vehicle in order to mitigate a hazard, these systems or devices shall meet the requirements of Practice **F2291-22a**, Subsection 5.2 Hazard Mitigations.

4.1.4 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.

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

4.1.6 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.

4.2 Slide Classification:

4.2.1 Water slides are classified by their physical and intended use characteristics. The classification may be a