



Designation: F1159 – 16

Standard Practice for Design of Amusement Rides and Devices that are Outside the Purview of Other F24 Design Standards¹

This standard is issued under the fixed designation F1159; 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 establishes information and procedures for the design of amusement rides and devices and major modifications to amusement rides and devices which the designer/engineer identifies as outside the purview of other ASTM F24 design standards.

1.1.1 Prior to designating an amusement ride or device as outside the purview of other ASTM F24 standards and subject to Practice F1159, the designer/engineer shall perform a review of all standards under the jurisdiction of the ASTM Committee F24 addressing amusement ride and device design and determine that Practice F1159 is appropriate and more applicable to the amusement ride or device than other ASTM Committee F24 practices addressing amusement ride and device design.

1.1.2 In making such a determination, the designer/engineer shall consider the following:

1.1.2.1 The general nature of the amusement ride or device;

1.1.2.2 The absence of relevant specific requirements or features addressed by other ASTM Committee F24 practices.

1.2 *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

[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](#)

¹ This practice is under the jurisdiction of ASTM Committee F24 on Amusement Rides and Devices and is the direct responsibility of Subcommittee F24.24 on Design and Manufacture.

Current edition approved Dec. 15, 2016. Published January 2017. Originally approved in 1988. Last previous edition approved in 2015 as F1159 – 15b. DOI: 10.1520/F1159-16.

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.

2.2 *Federal Document:*³

[OSHA 29 CFR Fall Protection Systems Criteria and Practices Part 1926.502 \(d\)](#)

3. Significance and Use

3.1 This practice provides designers/engineers of amusement rides and devices not addressed in the other ASTM Committee F24 standards with design references and criteria to use in design development.

4. General Design Requirements

4.1 *Design and Calculations*—Basic documentation and engineering analysis shall be in accordance with Practice [F2291](#).

4.2 *Drawings and Records*—Records shall be kept in accordance with Practice [F2291](#).

4.3 *Testing*—Document and record the testing performance of amusement rides and devices in accordance with the tests given in Practice [F1193](#).

DESIGN PROCEDURES

5. Patron Restraint, Clearance Envelope, and Containment Design Criteria

5.1 Patron restraint, clearance envelope, and containment design criteria shall be in accordance with Section 6 of Practice [F2291](#).

6. Amusement Ride and Device Structures Fastening, Mechanical Systems and Components, Fall Protection, Adhesive Bonding, and Coatings

6.1 Structures shall be designed in accordance with the provisions of Practice [F2291](#), Section 8.

6.2 *Welding*—Welding and welding procedures shall be in accordance with the provisions of Practice [F2291](#), Section 15.

6.3 *Fasteners*—Fasteners shall be designed in accordance with the provisions of Practice [F2291](#), Section 16.

³ Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

6.4 *Mechanical Systems and Components*—Mechanical systems and components shall be designed in accordance with the provisions of Practice **F2291**, Section 13.

6.5 *Fixed Air Supported Structures*—Fixed air supported structures shall be in accordance with subsection 8.36 of Practice **F2291**.

6.6 *Fall Protection*—Fall protection shall be in accordance with subsection 21.1 of Practice **F2291**.

6.7 *Adhesive Bonding*—Adhesive bonding shall be in accordance with subsection 16.3 of Practice **F2291**.

6.8 *Coatings*—Coatings shall be in accordance with subsection 20.1 of Practice **F2291**.

7. Electrical Components

7.1 Electrical components shall be designed in accordance with the provisions of Practice **F2291**, Section 12.

8. Hydraulic Components

8.1 Hydraulic components and systems shall be designed in accordance with the provisions of Practice **F2291**, Section 9.

9. Pneumatics

9.1 Pneumatics shall be designed in accordance with the provisions of Practice **F2291**, Section 10.

10. Operator Controls

10.1 Operator controls shall be designed in accordance with the provisions of Practice **F2291**, Section 17.

11. Brakes

11.1 When used, brakes shall be designed in accordance with Practice **F2291**, subsection 13.7.

12. Machine Guards

12.1 Machine guards shall be designed in accordance with the provisions of Practice **F2291**, Subsection 13.5.

13. Fencing for Amusement Rides and Devices Subject to this Standard

13.1 Fences shall be designed in accordance with the provisions of Practice **F2291**, Section 14.

14. Safety Related Control Systems

14.1 Safety related control systems shall be designed in accordance with the provisions of Practice **F2291**, Section 11.

15. Sanitation/Disinfection

15.1 Sanitation/disinfection shall be in accordance with subsection 22.1 of Practice **F2291**.

16. Acceleration Limits

16.1 Acceleration limits shall be in accordance with Section 7 of Practice **F2291**.

17. Keywords

17.1 amusement rides and devices; design; manufacture

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, Tel: (978) 646-2600; <http://www.copyright.com/>