



Designation: **F2959 – 12 F2959 – 14**

Standard Practice for Special Requirements for Aerial Adventure Courses¹

This standard is issued under the fixed designation F2959; 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 criteria for the Design, Manufacture, Installation, Operation, Maintenance, Auditing and Major Modification of Aerial Adventure Courses ~~manufactured~~ which occur(s) after the effective date of publication of this document except as noted in 1.3.

1.2 This practice applies to the following devices when operated for concession or commercial recreation.

1.2.1 Zip Lines.

1.2.2 Ropes Courses.

1.2.3 Challenge Courses.

1.2.4 Aerial Trekking Courses.

1.2.5 Canopy Tours.

1.3 This practice shall not apply to the following:

1.3.1 Aerial Adventure Courses when operated exclusively under the following applications:

1.3.1.1 Educational curriculum.

1.3.1.2 Physical fitness purposes.

1.3.1.3 Organized competitive events.

1.3.1.4 Therapeutic programs.

1.3.1.5 Training purposes.

1.3.1.6 Team and confidence building.

1.3.1.7 Playground equipment covered by Consumer Safety Performance Specification F1487.

1.3.2 Amusement rides and devices whose design criteria are specifically addressed in another ASTM standard.

1.3.3 Portions of an Aerial Adventure Course unaffected by a major modification.

1.3.4 Upgrades to electrical wiring, electrical motors and electrical components of Aerial Adventure Courses provided the original design and safety criteria are maintained or enhanced.

1.3.5 Pre-existing designs for Aerial Adventure Courses that are installed after the publication date of this practice if the design is service proven or previously compliant as specified by 1.3.5.1.

1.3.5.1 Aerial Adventure Course designs may qualify as “previously compliant” for five years following the date of publication of this practice. Thereafter, an Aerial Adventure Course design must qualify as “service proven” as defined in Practice F2291 or meet the requirements of this practice.

1.4 This practice includes an annex (mandatory), which provides additional information (for example, rationale, background, interpretations, drawings, commentary, and so forth) to improve the user’s understanding and application of the criteria presented in this practice. The annex information shall be interpreted as mandatory design criteria.

1.5 This practice includes an appendix (non-mandatory), which provides additional information (for example, rationale, background, interpretations, drawings, commentary, and so forth.) to improve the user’s understanding and application of the criteria presented in this practice. The appendix information shall not be interpreted as mandatory design criteria.

1.6 *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. Some specific hazards statements are given in Section 7 on Hazards.*

¹ This test method practice is under the jurisdiction of ASTM Committee F24 on Amusement Rides and Devices and is the direct responsibility of Subcommittee F24.60 on Special Rides/Attractions.

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2. Referenced Documents

2.1 ASTM Standards:²

- 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 (Withdrawn 2013)³
- F893 Guide for Auditing Amusement Rides and Devices (Withdrawn 2013)³
- F1193 Practice for Quality, Manufacture, and Construction of Amusement Rides and Devices
- F1487 Consumer Safety Performance Specification for Playground Equipment for Public Use
- F1772 Specification for Harnesses for Rescue, Safety, and Sport Activities
- F1957 Test Method for Composite Foam Hardness-Durometer Hardness
- F2137 Practice for Measuring the Dynamic Characteristics of Amusement Rides and Devices
- F2291 Practice for Design of Amusement Rides and Devices
- F2375 Practice for Design, Manufacture, Installation and Testing of Climbing Nets and Netting/Mesh used in Amusement Rides, Devices, Play Areas and Attractions

2.2 ANSI Standards:⁴

- ANSI B77 Passenger Ropeways - Aerial Tramways, Aerial Lifts, Surface Lifts, Tows and Conveyors - Safety Requirements
- ANSI Z359 Fall Protection Code

2.3 European Standard:⁵

- EN 12277 Mountaineering equipment - Harnesses - Safety requirements and test methods

2.4 NFPA Standard:⁶

- NFPA 1983 Standard on Life Safety Rope and Equipment for Emergency Services

2.5 UIAA Standard:⁷

- UIAA 105 Mountaineering and Climbing Equipment: Harnesses

3. Terminology

3.1 Terminology shall be in accordance with Terminology F747.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *aerial trekking course, n*—self-guided aerial adventure course containing elements intended to be obstacles.

3.2.2 *canopy tour, n*—aerial adventure course which provides patron access to the canopy of a forest.

3.2.3 *challenge course, n*—guided aerial adventure course containing elements intended to be obstacles.

3.2.4 *ropes course, n*—synonym for a challenge course.

3.2.5 *zip line, n*—an aerial adventure course element over an open span consisting of an inclined wire or fiber rope on which harnessed patron(s) suspended from a pulley or trolley are able to traverse with the primary force for propulsion being gravity.

4. Significance and Use

4.1 The rationale for developing a separate standard practice for Aerial Adventure Courses is based on the unique functional, operational and patron participation requirements when compared to amusement rides and devices.

4.2 The purpose of this practice is to provide designers, manufacturers, ~~owners/operators~~ constructors, system integrators, owners/operators, and auditors with criteria and references for use in the design, manufacture, construction, installation, integration, operation, maintenance, auditing, and major modification of ~~aerial adventure courses~~. Aerial Adventure Courses.

4.3 Unless this practice expressly provides otherwise in a particular provision, the term “Aerial Adventure Course” is to be used in place of “Amusement Rides and Devices” herein.

5. Owner/Operator Requirements

5.1 Ownership, operation, maintenance and inspection requirements for Aerial Adventure Courses shall be in accordance with Practice F770 with the following exceptions and inclusions:

5.1.1 Substitute the word “patron” for “passenger” when used.

5.1.2 *Include in Practice F770 Section 4, Subsection 4.1.1*—The Owner/Operator shall also consider environmental condition(s) including but not limited to wind, rain, ice, and lightning when developing operating procedures.

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

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁵ Available from European Committee for Standardization (CEN), Avenue Marnix 17, B-1000, Brussels, Belgium, <http://www.cen.eu>.

⁶ Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, <http://www.nfpa.org>.

⁷ Available from International Mountaineering and Climbing Federation (UIAA), 61 Postfach CH-3000 Bern 23 Switzerland, <http://www.theuiaa.org/index.php>.

5.1.3 *Practice F770 Section 4, Subsection 4.1*—Replace “Manufacturer” with “Designer/Engineer, Manufacturer and Training Entity.”

5.1.4 *Practice F770 Section 4, Subsection 4.1.1*, shall also include the operation policies and procedures with pertinent information from the Designer/Engineer, Manufacturer and Training Entity.

5.1.5 *Practice F770 Section 4, Section 4.1.2*—Specific emergency procedures in the event of an abnormal condition or an interruption of service shall include an access plan for performing evacuation, first aid and ground care of evacuated patrons.

5.1.6 *Practice F770 Section 4, Subsection 4.1.4.4* shall be replaced with the following:

5.1.6.1 Prior to carrying patrons, the Course shall be inspected and tested per the Designer/Engineer, Manufacturer and Training Entity’s requirements.

5.1.7 *Practice F770 Section 4*—Add the following:

5.1.7.1 *Documentation Retention Requirements*—Material and quality conformance certifications and documentation as required by the Designer/Engineer as outlined in *Practice F2291* or provided by Manufacturer’s requirements as outlined in *Practice F1193*, or both, must be retained during the life cycle of the of the Aerial Adventure Course.

5.1.7.2 The owner/operator shall develop a document retention policy for pertinent records including, but not limited to training and inspection records.

5.1.8 *Practice F770 Section 5, Subsection 5.1* shall be replaced with the following:

5.1.8.1 There are inherent risks in the participation in or on any Aerial Adventure Course which require appropriate patron awareness, participation, physical ability and dexterity. Patrons of Aerial Adventure Courses by participating, accept the risks inherent in such participation of which the ordinary prudent person is or should be aware. Patrons have a duty to exercise good judgment and act in a responsible manner while in or on any Aerial Adventure Course, and to obey all oral or written warnings, or both, prior to or during participation.

5.1.9 *Practice F770 Subsection 6.1* shall include the following:

5.1.9.1 Replace “Manufacturer” with “Designer/Engineer, Manufacturer and Training Entity.”

5.1.9.2 When one or more live tree(s) are utilized in an Aerial Adventure Course, qualified person(s) shall perform an arboricultural inspection to determine that the tree(s) are healthy and suitable for the intended use and that the original design intent is maintained. The inspections shall be performed:

- (1) At a frequency of not less than once per year,
- (2) After the occurrence of any significant environmental event, such as hurricane, tornado, lightning, ice storms, earthquake, flooding or drought,
- (3) After any change in surrounding environment that could alter the health and integrity of the trees utilized, such as removal of adjacent trees or development of adjoining properties,
- (4) Physical damage such as a major limb failure, when there is a change in the visible health of the tree or canopy, or both, due to disease or ~~insect~~-insect infestation.

5.1.9.3 *Practice F770 Section 6, Subsection 6.3.8*—The course shall be tested per the Designer/Engineer, Manufacturer and Training Entity’s requirements.

5.1.9.4 *Practice F770 Subsection 8.3*—Replace “Manufacturer” with “Designer/Engineer, Manufacturer and Training Entity.”

5.1.9.5 When developing the check lists as described in Subsection 6.1, the following terms are to be defined as follows:

- (1) Inspection—Visual procedure.
- (2) Test—Functional check.
- (3) Quantitative Measurement or Analysis—Use of equipment to measure or analyze.
- (4) Diagnosis—Decision or conclusion based on data compiled from an inspection, test, quantitative measurement or analysis, or a combination thereof.

6. Testing Performance

6.1 Testing performance shall be in accordance with Guide **F846**.

7. Auditing

7.1 Auditing requirements shall be in accordance with Guide **F893**.

8. Quality, Manufacture, and Construction Requirements

8.1 Quality, manufacture, and construction shall be in accordance with *Practice F1193*.

9. Testing Composite Foam

9.1 Testing Composite Foam shall be in accordance with Test Method **F1957**.

10. Measuring Dynamic Characteristics

10.1 Measuring Dynamic Characteristics shall be in accordance with *Practice F2137*.