



Designation: F2729 – 18

## Standard Consumer Safety Specification for Constant Air Inflatable Play Devices for Home Use<sup>1</sup>

This standard is issued under the fixed designation F2729; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This consumer safety specification establishes performance requirements, test methods, and labeling requirements to promote the safe use of constant air inflatable play devices for private home use. Constant air inflatable play devices for home use that incorporate water play features and do not retain water are not considered as portable pools. Constant air inflatable play devices for home use that incorporate water play features and are intended to hold water for wading or water recreational purposes are applicable to the marking and labeling section of this specification. This specification does not apply to stored air inflatable swimming pools or sealed inflatable devices whether or not they retain water.

1.2 This consumer safety specification provides safety requirements for various types of constant air inflatable play devices for home use intended for children aged from two (2) years through twelve (12) years.

1.3 This consumer safety specification is intended to reduce the risk of death and minimize serious injury to children resulting from use of constant air inflatable play devices for home use.

1.4 No constant air inflatable play devices for home use produced after the approval date of this consumer safety specification shall, either by label or other means, indicate compliance with this specification unless it conforms to all requirements contained herein. The following statement is suggested for use in identifying a product that conforms to all requirements in this specification:

1.4.1 “This product conforms to ASTM F2729, Standard Consumer Safety Specification for Constant Air Inflatable Play Device for Home Use.”

1.5 The test values and dimensions stated in SI units are to be regarded as standard. The inch-pound values in parenthesis, when given, are for information only.

1.6 *General Measures, Tolerances, and Conversions:*

1.6.1 The general tolerances for this specification (unless otherwise specified) are as follows:

Dimension Tolerance

$X \pm 12.7 \text{ mm}$  ( $X \pm 0.5 \text{ in.}$ )

$X.X \pm 1.27 \text{ mm}$  ( $X.X \pm 0.05 \text{ in.}$ )

$X.XX \pm 0.127 \text{ mm}$  ( $X.XX \pm 0.005 \text{ in.}$ )

These tolerances still apply to a dimension even when terms like greater than, less than, minimum, or maximum are used.

1.6.2 The values stated in SI units are to be regarded as standard. The values given in parentheses are mathematical conversions to inch-pound units that are provided for information only.

1.6.3 The conversion factor from SI to inch-pound units is  $25.4 \text{ mm} = 1 \text{ in.}$ , and  $0.45359 \text{ kg} = 1 \text{ lb.}$

1.7 The following precautionary caveat pertains only to the test methods portion of this consumer safety specification: *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, 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:*<sup>2</sup>

[D1683 Test Method for Failure in Sewn Seams of Woven Fabrics](#)

[D2240 Test Method for Rubber Property—Durometer Hardness](#)

[D5034 Test Method for Breaking Strength and Elongation of Textile Fabrics \(Grab Test\)](#)

[F963 Consumer Safety Specification for Toy Safety](#)

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F15 on Consumer Products and is the direct responsibility of Subcommittee F15.61 on Constant Air Inflatable Play Devices for Home Use.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto: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 Regulations:<sup>3</sup>

- 16 CFR 1303 Ban of Lead-Containing Paint and Certain Consumer Products Bearing Lead Containing Paint
- 16 CFR 1500 Federal Hazardous Substances Act regulations, including sections:
- 1500.44 Method for Determining Extremely Flammable and Flammable Solids
- 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 or in Other Articles Intended for Use by Children Under 8 Years of Age
- 1500.50 Test Methods for Simulating Use and Abuse of Toys and Other Articles Intended for Use by Children
- 1500.52 Test Methods for Simulating Use and Abuse of Toys and Other Articles Intended for Use Over 18 But Not Over 36 Months of Age
- 1500.53 Test Methods for Simulating Use and Abuse of Toys and Other Articles Intended for Over 36 But Not Over 96 Months of Age
- 1500.87 Children's Products Containing Lead: Inaccessible Component Parts
- 1500.88 Exemptions from Lead Limits Under Section 101 of the Consumer Product Safety Improvement Act for Certain Electronic Devices
- 1500.91 Determinations Regarding Lead Content for Certain Materials or Products Under Section 101 of the Consumer Product Safety Improvement Act
- 16 CFR 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
- 16 CFR 1505 Requirements for Electrically Operated Toys or Other Electrically Operated Articles Intended for Use By Children

## 2.3 Other:

- ANSI Z535.4 Product safety signs and labels<sup>4</sup>
- Beaufort Wind Force Scale
- CPAI 84 A Specification for Flame-Resistant Materials used in Camping Tentage
- UL 1450 Standard for Motor-Operated Air Compressors, Vacuum Pumps, and Painting Equipment<sup>5</sup>

## 3. Terminology

### 3.1 Definitions of Terms Specific to This Standard:

- 3.1.1 *blower*, *n*—a powered fan used to inflate the inflatable device.
- 3.1.2 *blower tube*, *n*—the part of the inflatable device to which the blower is connected to the inflatable device for the purpose of inflation.

<sup>3</sup> Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, <http://www.access.gpo.gov>.

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

<sup>5</sup> Available from Underwriters Laboratories (UL), 333 Pfingsten Rd., Northbrook, IL 60062-2096, <http://www.ul.com>.

3.1.3 *constant air inflatable play device*, *n*—a structure relying on a continuous supply of air pressure to maintain its shape, on or in which users play.

3.1.3.1 *Discussion*—This term constant air inflatable play device refers to the simplified term “inflatable device” throughout the remainder of the document.

3.1.4 *critical fall height*, *n*—the upper limit of all free heights of fall, for which the surface provides adequate levels of impact attenuation.

3.1.5 *flaming debris*, *n*—material that becomes detached from the sample during the test procedure and continues to flame as it falls.

3.1.6 *free height of fall*, *n*—the greatest distance from the clearly intended body support to the fall zone below.

3.1.7 *grounding*, *n*—contact with the underlying surface on which the inflatable device sits.

3.1.8 *load bearing components*, *n*—those components intended to bear the mass of the users. Examples of these include but are not limited to: surfaces intended to be bounced on, slides, steps, ladders, footholds, gripping and grasping devices, climbing devices, transition platforms, containment walls that enclose a surface intended to be bounced on, ramps, tunnels, pools, and anchoring devices.

3.1.9 *molten drips*, *n*—falling droplets of molten material.

3.1.10 *non-climbable net or mesh*, *n*—a fabric or synthetic material that is not intended to be climbed.

3.1.11 *non-load bearing components*, *n*—those components not intended to bear the mass of the users. Examples of these include but are not limited to: decorative items such as flags, areas under bouncing surfaces, air baffles, blower tubes, roof, and un-inflated areas.

3.1.12 *non-rigid*, *n*—any material having hardness below 70 Shore A scale durometer, as measured by the latest revision of Test Method **D2240**.

3.1.13 *open side*, *n*—any external side of an inflatable device with no containment wall.

3.1.14 *platform*, *n*—any surface on which users stand, sit or traverse.

3.1.15 *playing area*, *n*—any part or area of the inflatable device that is intended solely for the purpose of taking part in the activity for which the inflatable device is designed.

3.1.16 *ramp*, *n*—an inclined section aiding the access and egress of users into and out of the playing area.

3.1.17 *rigid*, *n*—any material having hardness above or equal to 70 Shore A scale durometer, as measured by the latest revision of Test Method **D2240**.

3.1.18 *run-out section*, *n*—intended deceleration zone at the bottom of a slide.

3.1.19 *sealed inflatable device*, *n*—a structure or device on or in which users play that is inflated by means of air and, having achieved the design pressure, is sealed and does not require additional continuous inflation.

3.1.20 *toy accessory, n*—an article that provides certain play value separate from, but attached to or sold with, the inflatable device intended for playtime use by a child.

3.1.21 *use zone, n*—an area beneath and immediately adjacent to the inflatable device that is designed for unrestricted circulation around the inflatable device.

**4. Calibration and Standardization**

4.1 Unless otherwise noted, the inflatable device shall be completely assembled in accordance with the manufacturer’s instructions.

4.2 The inflatable device to be tested shall be inflated at an ambient temperature of  $23 \pm 5^{\circ}\text{C}$  ( $73 \pm 9^{\circ}\text{F}$ ) for at least one hour prior to testing. Testing shall be conducted within this temperature range.

4.3 All structural testing required by this specification shall be conducted on the same unit.

**5. General Requirements**

5.1 There shall be no hazardous sharp points or edges as defined in 16 CFR 1500.48 and 16 CFR 1500.49, before or after the inflatable device has been tested to this consumer safety specification.

5.2 There shall be no small parts as defined in 16 CFR 1501 before testing or liberated as a result of testing to this specification for inflatable devices intended for children under 36 months.

5.3 All surface coatings on the inflatable device shall comply with the requirements of 16 CFR 1303 and the Heavy Metals requirements of Consumer Safety Specification F963.

5.4 Accessible component parts (before and after Use-and-Abuse testing described at 16 CFR 1500.50–53 and 16 CFR 1500.87(h)) shall not contain lead or lead compounds in which the lead content (calculated as lead metal [Pb]) is in excess of 100 ppm.

5.5 The constant air inflatable shall be designed to allow natural air circulation and lines of visibility between users and persons supervising when evaluated according to 5.5.1.

5.5.1 The constant air inflatable shall be designed to allow a portion of a cube with the size of  $0.057 \text{ m}^3$  ( $2 \text{ ft}^3$ ) to be viewed from at least 2 points on a perimeter line placed at a distance of 2.75 m (9 ft) from the perimeter of the constant air inflatable and spaced at a distance of at least 2.75 m (9 ft) from each other, and viewed from a height of 1.5 m (5 ft) above the perimeter line. (See Fig. 1.)

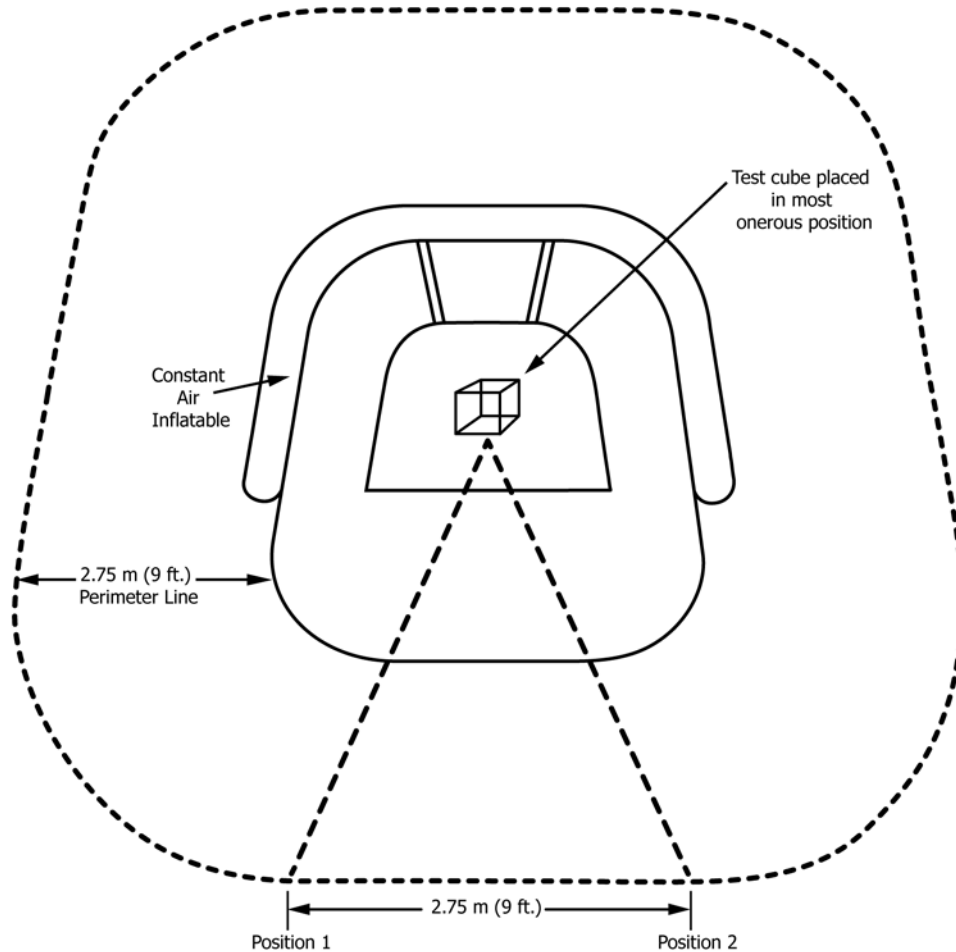


FIG. 1 Lines of Visibility

5.6 *Fabric Strength*—Fabrics shall be of adequate tear and tensile strength for the weight of the intended users and have sufficient air retention abilities to enable the inflatable device, when pressurized utilizing the manufacturer’s blower, to resume its intended shape after distortion under load. Fabrics used in those areas of the inflatable device that are load-bearing shall have the following as a minimum:

5.6.1 When tested in accordance with Test Method D5034, fabrics shall have a minimum tensile strength of 480 N (108 lb) and a minimum tensile strength of 50 % of its original tensile strength after being subjected to 100 hours of conditioning set forth in CPAI 84, Section 4.2.2.3.

5.6.2 Minimum seam strength of 380 N (85 lb) when tested in accordance with Test Method D1683.

5.6.3 Non-load bearing components are exempt from these requirements.

5.7 *Flamability*—Flexible fabric-like materials used in the inflatable device shall be tested according to a modified version of the flammability of solids test method in 16 CFR 1500.44, as follows:

5.7.1 Cut test samples with dimensions of at least 610 by 100 mm (24 by 4 in.) from each accessible material available on the inflatable device. Each test sample shall be made of one material. Where possible, ensure that the sample does not include seamed edges. As seams modify the rate of spread of flame, they shall be placed in the upper part of the sample holder. If there is insufficient material to make a full sample as described above, it is acceptable to use two equal pieces of the same material with dimensions of 305 by 100 mm (12 by 4 in.) so that when they overlap, a full sample of at least 610 by 100 mm (24 by 4 in.) is obtained. In order to ensure that there is no gap at the overlap, it is acceptable to use staples to secure the joint.

5.7.2 As the rate of flame spread can be different with the direction of the fabric-like material, where there is enough material, cut the test sample with the length corresponding to the vertical direction of the inflatable when in use.

5.7.3 Place the sample in an appropriate sample holder, slightly tensioned to avoid creases, waving or curling. Both surfaces of the same material shall be tested separately.

5.7.4 Position the sample holder at a 45° (0.785 rad) angle.

5.7.5 Apply the test candle flame to the bottom edge of the test sample.

5.7.6 The rate of flame spread shall not exceed 25.4 mm/s (1.0 in./s) or shall self-extinguish. There shall be no flaming debris or molten drips.

NOTE 1—Debris that builds up on the edges of test bracket and drips is not classified as molten drips.

5.8 *Solids Flammability*—Solid materials used in the inflatable device shall be tested according to the flammability of solids test method in 16 CFR 1500.44.

5.9 *Non-Climbable Netting or Mesh*—Where used for containment or retention, the netting or mesh shall meet the strength requirements described in 5.6. The mesh size shall be small enough to prevent the 12 mm (0.5 in.) rod from passing through when tested as follows:

5.9.1 *Test Procedure for Non-Climbable Net or Mesh*—Align the probe (see Fig. 2) perpendicular to the net or mesh. Push the probe, with a 4.45 N (1.0 lbf), round end first, into the net or mesh. A net or mesh is non-climbable if the probe enters equal to or less than 12 mm (0.5 in.) deep.

5.10 *Rope Climber Nets*—Rope climber nets shall be securely attached at both ends to the inflatable device to prevent lifting by users. The rope shall be a minimum of 12 mm (0.5 in.) in diameter and securely knotted at intersections so that the knots do not slip when subjected to a 140 kg (308 lb) load or three times the manufacturer’s maximum intended weight of the user, whichever is greater.

5.11 Climber nets shall comply with head and neck entrapment requirements in section 6.4.

5.12 *Climbing Ropes*—Climbing ropes shall be anchored at both ends and not be capable of being looped back on itself, creating an inside loop perimeter greater than 125 mm (5 in.).

5.13 *Zippers*—Zippers shall withstand the air pressure generated within the inflatable device. If zippers are used, they shall be easy to use from both sides. Zippers used for deflation purposes shall have the zipper pull covered from view (for example, by a flap or pocket).

6. Performance Requirements

6.1 *Anchoring*:

6.1.1 Sufficient anchor points shall be provided and located under the load and wind velocities described below to enable stability and restraint to be maintained under the manufacturer’s recommended maximum loading condition and wind velocity. Anchoring for inflatable devices for outdoor use shall be designed to withstand a minimum Beaufort scale 6 wind speed (11.1 m/s).

6.1.2 The number of anchor points required shall be calculated, independently for each side, using the following formula and values below. There shall be a minimum of two anchor points per side when the result of the calculation for anchor points is less than 2. First calculate the force on each side using:

$$F = C_w \frac{\rho}{2} V^2 A \tag{1}$$

where:

- F = force on the side,
- C<sub>w</sub> = wind coefficient,
- ρ = density of air,



FIG. 2 Non-Climbable Net or Mesh Probe