



Designation: F3681 – 24

Standard Consumer Safety Specification for Beach Umbrellas and Anchor Devices¹

This standard is issued under the fixed designation F3681; 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.

INTRODUCTION

This consumer safety specification addresses incidents associated with beach umbrellas that were identified by the U.S. Consumer Product Safety Commission (CPSC). Incidents identified by CPSC and addressed in this standard include lacerations and impalement from the shaft/pole of a windblown airborne beach umbrella. Umbrellas are commonly used as protection against sun, rain, or other potential weather on beaches, in recreation areas, and at resorts. In windy conditions, beach umbrellas have detached from the sand, and the windblown umbrella shaft has impacted various parts of a bystander's body, has caused serious injury and at least two deaths. *It has been established through empirical testing that umbrellas without effective anchoring devices are NOT safe for use on beaches.* This specification is written to address currently available beach umbrella/anchor systems and future beach umbrella/anchor system designs. It is intended to be updated if substantive information becomes available that necessitates additional requirements or justifies revision of existing requirements.

1. Scope

1.1 This consumer safety specification establishes performance requirements for beach umbrella/anchor systems to prevent the beach umbrella/anchor system from detaching from the sand, including any entity that provides the use of beach umbrellas.

1.2 No products existing or manufactured after the approval date of this consumer safety specification shall, either by label or other means, indicate compliance with this specification unless they conform to all applicable requirements contained herein.

1.3 Test methods in this specification are to be used for the evaluation of beach umbrella/anchor systems to determine the suitability of the beach umbrella/anchor system in a use environment based on safety in wind conditions.

1.4 *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.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

¹ This consumer safety specification is under the jurisdiction of ASTM Committee F15 on Consumer Products and is the direct responsibility of Subcommittee F15.79 on Market Umbrellas.

Current edition approved April 1, 2024. Published April 2024. DOI: 10.1520/F3681-24.

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

D2487 Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

2.2 *ANSI Standards:*³

ANSI Z535.1 Safety Colors

ANSI Z535.4 Product Safety Signs and Labels

ANSI Z535.6 Product Safety Information in Product Manuals, Instructions and Other Collateral Materials

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *anchor device, n*—a device that is attached to or integrated into the umbrella pole and is secured in or on the sand on a beach, which enables the umbrella to perform in an open upright or angled position and prevents the umbrella from becoming airborne.

3.1.2 *area of the umbrella plane, n*—the number of square feet of the umbrella plane as derived using geometric calculations (see calculation in 7.3).

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

3.1.3 *beach umbrella, n*—a removable device installed in or on the sand on a beach, consisting of a canopy supported by a single shaft/pole, used as protection against sun, rain, or other potential weather.

3.1.4 *beach umbrella/anchor system, n*—a beach umbrella combined with an anchor device that is either attached to the pole or integrated with the pole.

3.1.5 *canopy, n*—cloth or other material covering a folding frame.

3.1.6 *secure, adj*—not detached from the sand.

3.1.7 *subangular, adj*—one of the six standard categories used commercially to describe the shape of sand or rock particles; subangular means free from sharp angles, though not smoothly rounded.

3.1.8 *umbrella plane, n*—a two-dimensional shape formed by the lower edges of the umbrella canopy.

3.1.9 *wind tunnel, n*—a facility used to simulate the air flow conditions around either a stationary object or an object moving through air.

4. Calibration and Standardization

4.1 Angle measurements shall be obtained using a digital inclinometer capable of 0.1° minimum resolution.

4.2 Force measurements shall be obtained using a gauge with a minimum accuracy of ±0.25 lbf.

4.3 Wind tunnels used to evaluate performance may be open or closed circuit, with a test section of sufficient size to

accommodate the anchored beach umbrella sample, capable of flow uniformity of 0.5 % to 2 %, and capable of wind speeds more than 40 mph.

5. General Requirements

5.1 The product must be in an undamaged condition and fully functional for testing.

5.1.1 If repetitive tests are done, the product must remain in an undamaged condition for subsequent tests.

6. Performance Requirements

6.1 *Attachment Strength*—Beach umbrella poles and anchors shall be so constructed that the product(s) remains secure (see 3.1.6) in or on the sand surface when tested per 7.5 or 7.6.

6.2 Beach umbrella/anchor systems with an area of the umbrella plane 45 ft² or less may use either test in 7.5 or 7.6.

6.3 Beach umbrella/anchor systems with an area of the umbrella plane over 45 ft² must use the test in 7.6.

NOTE 1—The test in 7.5 simulates the upward lift force created by a 30-mph wind on an umbrella canopy with an area of the umbrella plane up to 45 ft².

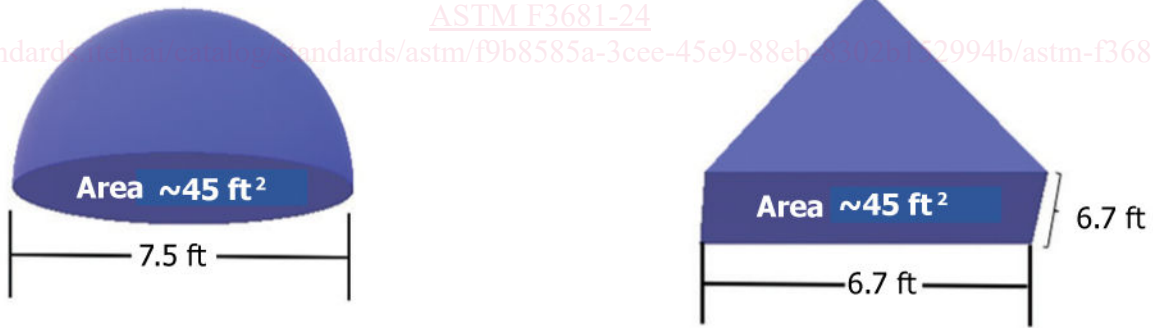
7. Test Methods

7.1 The umbrella/anchor system shall be tested in a test fixture/sand box having the minimum test area dimensions of 3 ft long by 3 ft wide by 2 ft deep. The box shall be filled with subangular quartz sand (typical of beach sand) consisting of at least 90 % (by weight) sand which is “coarse-grained” as defined in Practice D2487.

Document Preview

ASTM F3681-24

<https://standards.ohio-state.edu/standards/astm/f9b8585a-3cee-45e9-88eb-50f2b152994b/astm-f3681-24>



Area is calculated based on a two-dimensional plane formed by the lower edges of the umbrella.

- For a dome-shaped or cone-shaped umbrella canopy as shown above on the left, the plane is a circle.
- For an irregularly-shaped umbrella canopy, a suitable geometric calculation of the plane must be done. A simple example is a pyramid, as shown above on the right, where the plane is a rectangle; in this example, a square.

FIG. 1 Test Umbrella Plane Area Calculation

7.2 The test shall be documented with time-stamped video.

7.3 Calculate the test umbrella plane area (see Fig. 1):

7.4 The product shall be completely assembled, unless otherwise noted, in accordance with the manufacturer’s instructions.

7.5 *Mechanical Pull Test of Beach Umbrella/Anchor System*—When using this test, an anchor device that is sold separately from an umbrella does not have to be tested with a canopy. A pole may be used that matches the specifications of most beach umbrella poles. However, this test is only valid for anchors intended for use with canopies that have an umbrella plane area up to 45 ft² or less, which must be stated on the anchor product and product packaging as described in 8.4.

7.5.1 Some umbrella poles have a top half and bottom half which separate. Either the bottom portion of the pole, if detachable, or the whole beach umbrella may be used (see Fig. 2). Install the beach umbrella (or bottom portion of the pole) with anchor system into or on the sand ($\pm 3^\circ$ from vertical), in accordance with the manufacturer’s instructions, and in the center of the container to stay clear of the sides (see Fig. 3). (Note that some form of anchor device is expected to be attached to or integrated with the pole. An anchor device is not depicted in Fig. 3 because designs vary.)

7.5.2 Tilt the beach umbrella pole (or bottom portion of the pole) to an angle of 20° from the vertical starting position (see Fig. 4). An inclinometer shall be used to determine the tilt of the pole.

NOTE 2—This step simulates the degradation in anchor strength of a beach umbrella pole/anchor system due to vibration and forces generated over time by wind drag on the canopy of the beach umbrella.

7.5.3 If the bottom part of the pole is detachable as shown in Fig. 2, attach a force gauge to the top of the bottom pole piece as shown in Fig. 5. If the beach umbrella pole is constructed as one piece and not detachable, attach a force gauge to the top of the beach umbrella as shown in Fig. 5. In this case, the canopy may remain closed.

7.5.4 Apply a constant pull force of 75 lbf within 5 s in-line with the axis of the pole and hold for 20 s (see Fig. 5).

NOTE 3—This test simulates the upward lift force created by a 30-mph wind on an umbrella canopy with an umbrella plane area of 45 ft² or less.

7.5.5 The beach umbrella/anchor system shall remain secure (see 3.1.6) to meet the performance standard.

7.6 *Wind Tunnel Test of Beach Umbrella/Anchor System*—When using this test, an anchor device that is sold separately from an umbrella must pass the test in the wind tunnel while attached to an umbrella, which may be manufactured by a different entity. The test umbrella’s canopy plane area must be stated on the anchor product and product packaging as described in 8.4.

7.6.1 This test shall be conducted in a wind tunnel facility capable of accommodating the umbrella fully assembled/opened and installed in the test fixture/sand box. For this test method, a wind tunnel of sufficient size is required so that the beach umbrella, anchoring device, and sand box fit reasonably within the test section or diffuser of the wind tunnel. The wind speed in the wind tunnel shall be determined by measurements collected upstream of the beach umbrella/anchor system under study.

NOTE 4—This test simulates the degradation in anchor strength of a beach umbrella/anchor system due to vibration and forces generated by wind-drag on the canopy of the beach umbrella.

7.6.2 Install the beach umbrella/anchor system into or on the sand ($\pm 3^\circ$ from vertical), in accordance with the manufacturer’s instructions, and in the center of the container to stay clear of the sides. Open the beach umbrella canopy.

7.6.3 A safety tether, such as a metal security cable, shall be connected to the beach umbrella/anchor system and to an immovable object.

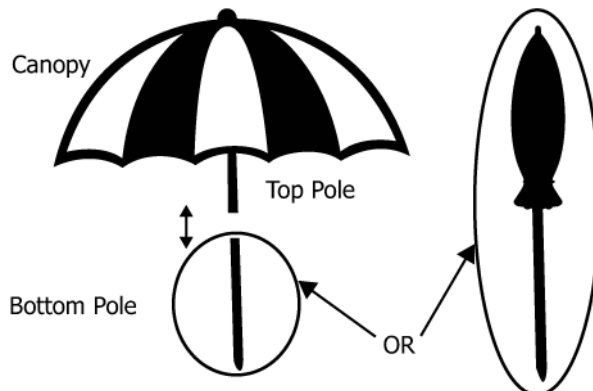
7.6.4 Accelerate the wind tunnel from 15 mph (or from the wind tunnel’s minimum constant speed, if higher than 15 mph) to a maximum speed of 30 mph in 5 mph increments, holding each wind speed for 5 min.

7.6.5 Maintain a 30-mph wind speed for an additional 30 min.

7.6.6 The beach umbrella/anchor system shall remain secure (see 3.1.6) to meet the performance standard.

8. Marking and Labeling

8.1 Each product and its retail package shall be marked or labeled clearly, legibly, and permanently to indicate the following:



Either the bottom portion of the pole (if detachable) or the whole beach umbrella may be used.

FIG. 2 Whole Beach Umbrella or Bottom of Pole for Test

+/- 3° from vertical

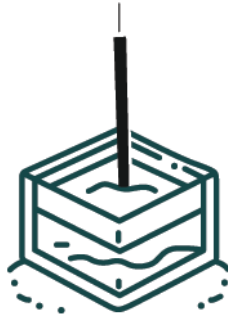


FIG. 3 Pole (canopy removed) in Sand Box

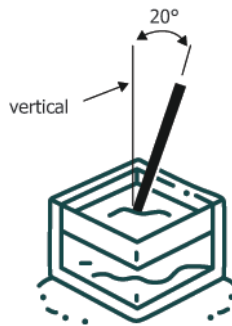


FIG. 4 Pole (canopy removed) Tilted in Sand Box

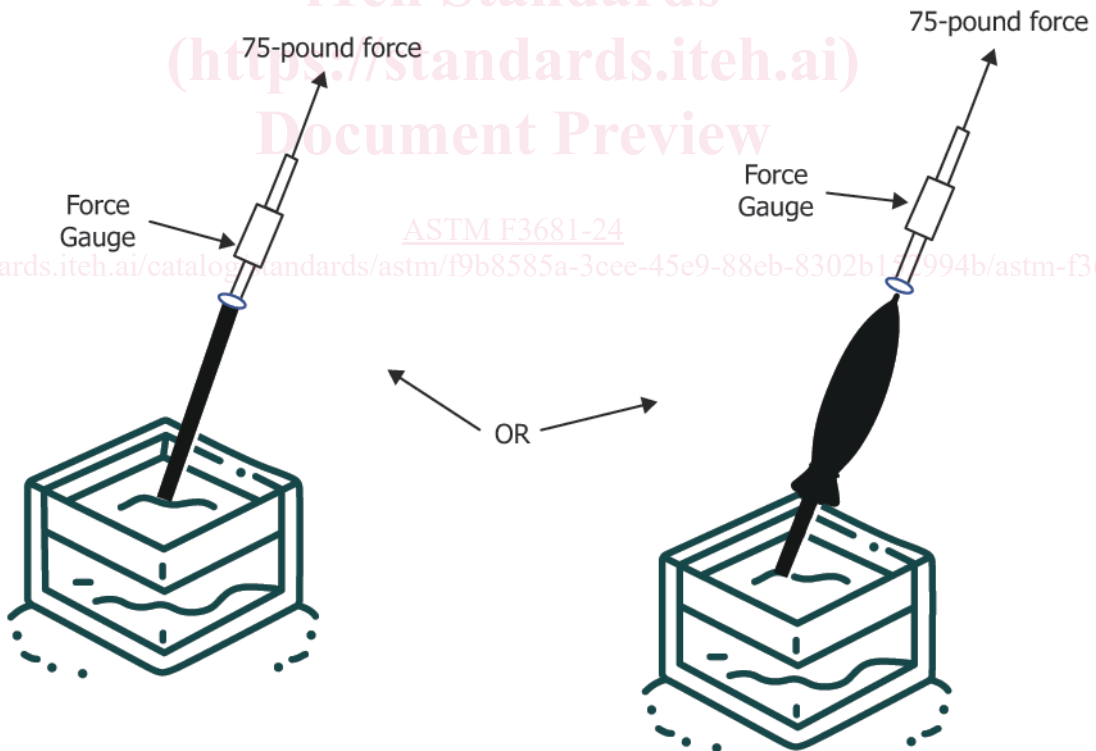


FIG. 5 Force Gauge on Top of Bottom Pole Piece or on Top of Umbrella

8.1.1 The name, place of business (city, state, and mailing address, including zip code), and telephone number of the manufacturer, distributor, or seller.

8.1.2 A code mark, tracking label, or other means that identifies the date (month and year as a minimum) of manufacture.