

A2 WIND TUNNEL

117 Godspeed Ln. Mooresville NC 28115
(704) 799-1001

Stella Umbrella 7.5 ft vented canopy ASTM F3681-24 Beach Umbrella Testing 12-03-2024



1.0 PURPOSE:

Measure the stability and durability of the Stella Umbrella 7.5 ft vented canopy umbrella at high wind speed. Testing designed to evaluate usability in real world high wind speed environment applications.

2.0 TEST PROCEDURE:

- 2.1. The umbrella was tested at A2 Wind Tunnel, Aerodyn Technologies. A reputable aerodynamics testing facility. A2 Wind Tunnel is an open return Eiffel style wind tunnel, 14ft x 10ft cross section capable of producing uniform consistent winds up to 85 miles per hour.
- 2.2. All test procedures done in accordance with ASTM Standard Consumer Safety Specification for Beach Umbrellas and Anchor Devices F3681-24, Section 7 as listed below.
 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.
 - 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.
 - 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 If the umbrella canopy inverts, dislodges from the bottom pole, or fails to function in any way including failing to remain fully opened or if the umbrella frame is damaged in any way, the test of the effectiveness of the anchor device is compromised, and the test has failed.
 - 7.6.7 The beach umbrella/anchor system shall remain secure (see 3.1.63.1.7) to meet the performance standard.
 - 2.3. Sand used in testing in accordance with ASTM Standard F3681-24 as defined in ASTM Practice D2487 is not "typical beach sand" as stated in 7.1 and more closely resembles fine pea gravel.³
 - 2.4. Umbrella pole inserted 2 ft deep into medium as prescribed by manufacturer's instructions.
 - 2.5. Sand box environment and umbrella installation conducted by A2 Wind Tunnel personnel. Tunnel operation, wind speed measurement, and certified report conducted by A2 Wind Tunnel personnel.

3.0 Results:

Wind tunnel test portion of ASTM Standard Consumer Safety Specification for Beach Umbrellas and Anchor Devices F3681-24

****PASSED - Completed without failure****

Certified by: Geoffrey Eaker
A2 Wind Tunnel