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Standard Test Method for Evaluating Wind Safety and Durability of Market Umbrellas¹

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INTRODUCTION

Market umbrellas (MUs) are commonly used as protection against rain, sun, or other potential weather in home, recreation, and commercial business settings. Buyers involved in the selection, use, and maintenance of market umbrellas, as well as customers of businesses who desire protection of weather, can be exposed to numerous hazards capable of causing harm when an improperly designed, installed, or maintained market umbrella has contact with the human body. The deleterious effects of a market umbrella being blown over or broken by wind forces can range from acute injury, such as cuts or bruises, to blunt force trauma, such as concussions or broken bones.

MUs range from 4 ft to over 40 ft in diameter of multiple materials of construction, designs, shapes and base or stanchions. MUs are often selected based on these factors, but equally important is the safety, overall structural integrity of the MU, and durability, how long the market umbrellas will last in service, allowing the end user to safely carry out his or her assigned work tasks or enjoy the weather protection and comfort of the MU.

No known standards apply to the design and manufacture of market umbrellas. Additionally, MU designs vary depending on different end use applications and settings of use. Consequently, purchasers are faced with a variety of MU products and generally depend on manufacturer sales information to decide which MU is appropriate for their specific application. Base stanchion weights and methods must also be selected and integrated with the MU to provide an accurate assessment.

This standard is intended to provide standardized methods for evaluating the wind safety and durability of MU using a wind tunnel and rating the performance of the MU on a standardized scale. This standard may also be used by MU manufacturers to assess current or proposed designs.

1. Scope

1.1 These test methods are intended for evaluating market umbrellas (MUs) to determine the suitability of the MU in a use environment on the basis of wind safety and durability.

1.1.1 Procedure A is a safety scenario intended to test the structural strength of the MU to a uniform wind force generated by a wind tunnel.

1.1.2 Procedure B is a wind durability scenario intended to determine the ability of the MU to perform in a high wind weather environment for a sustained period.

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

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1.1.3 The performance of the MU is then rated using the Beaufort Scale, as shown in [Annex A1](#), to communicate the safety and durability performance of the MU.

1.2 These test methods apply to most MUs designed for use in-home setting, such as pool or patio areas; recreation areas, such as the beach, pool, or tennis courts; and business settings, such as theme parks, water parks, resort pools, hotels, restaurants, cafés, and other business settings.

1.3 The values as stated in inch-pound units are to be regarded as the standard. The values in parentheses are given for information only.

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 Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 Other Documents:

Beaufort Scale Beaufort Wind Force Scale²

ASCE/SEI 7-10 Minimum Design Loads for Buildings and Other Structures—Chapter 31, Wind Tunnel Procedure³

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *care, n*—procedures for cleaning and storage of market umbrella.

3.1.2 *contamination, n*—the addition of an undesired soil or stain-causing substance to the market umbrella.

3.1.3 *degradation, n*—a deleterious change in one or more properties of a material.

3.1.4 *end user, n*—the entity or organization whose employees or customers ultimately use the market umbrella.

3.1.5 *installation, n*—procedures for placing, fitting, and adjusting market umbrellas and preparing market umbrellas for use.

3.1.6 *maintenance, n*—procedures for inspection, repair, and removal from service of market umbrella.

3.1.7 *market umbrella, n*—a removable device consisting of a canopy of cloth or other material on a folding frame supported by a central or cantilever rod, used as protection against rain, sun, or other potential weather.

4. Summary of Test Method

4.1 In Procedure A, the safety of the MUs and base components are evaluated by subjecting the MU to a uniform wind generated by a wind tunnel. The MU is inspected prior to and after the series of escalating wind speeds to assess any changes in the MU's structural integrity.

4.2 In Procedure B, the wind durability of the MU and base components are evaluated by observing the ability of the MU to perform in a high wind weather environment for a sustained period of time. As in Procedure A, the MU is inspected prior to and after a fixed wind speed for a set period of time to assess changes in the MU's structural integrity.

4.3 For each option, the MU safety and durability and base components are assessed by examining the test subject's structural parts and performance. These data are used to evaluate and rate the wind safety and durability following each test using the Beaufort Scale to correlate the wind speed safety

and durability determined in the testing to visual and subjective observation of the area of uses of the MU.

5. Significance and Use

5.1 These test methods establish standard procedures designed for evaluating the performance wind safety and durability characteristics of MUs.

5.2 These test methods are suitable for both end users and manufacturers to evaluate performance characteristics of MUs and base mounting components.

5.2.1 End users may use these test methods to determine how well MUs and base components meet their particular application and conditions of use.

5.2.2 Manufacturers of MUs and base mounting components may use these test methods to determine the wind performance characteristics in existing or proposed designs.

5.3 Procedure A is an evaluation of MU structural integrity (pole, frame, canopy, and base components) by subjecting the MU to a uniform wind generated by a wind tunnel. Procedure B is an evaluation of MU and base component durability by subjecting the MU to a uniform wind generated by a wind tunnel for a fixed period of time. Each procedure is used to rate MU and base stanchion performance using the Beaufort Scale for users to be able to correlate the wind speed safety and durability determined in the testing to visual and subjective observation of the area of uses of the MU.

5.4 Results from use of these test methods on one type of MU and base components are not comparable to other test results on a different MU due to differences in MU materials and designs used for poles, frames, canopies, vents, and hubs as well as base weights, shapes, and holding mechanisms.

5.5 These test methods are not intended to assess cleaning or other weather stress resulting from wear and tear in an actual use environment.

5.6 End users and manufacturers of MU and base components should consider these test methods to be minimum procedures for evaluating MU and base component wind safety and durability characteristics as a wind tunnel procedure is considered to produce the most accurate wind pressures of any method according to ASCE/SEI 7-10 Wind Tunnel Procedure. Users of these test methods may wish to consider additional tests and procedures that relate directly to their application such as finite element analysis software.

5.7 Each buyer of a MU should establish its own criteria for assessing acceptable safety and durability performance.

6. Apparatus

6.1 *Wind Tunnel*—A wind tunnel is a facility used to simulate the flow conditions around either a stationary object or a moving object through air. For this test method, a wind tunnel of sufficient size is required so that the MU under study fit reasonably within the test section or diffuser of the wind tunnel. The wind speed in the wind tunnel should be determined by measurements collected upstream of the MU under study.

² Available from National Weather Service, <https://www.weather.gov/mfl/beaufort>.

³ Available from American Society of Civil Engineers (ASCE), 1801 Alexander Bell Dr., Reston, VA 20191, <http://www.asce.org>.