



MEETING LOG

SUBJECT: ASTM F15.79 Subcommittee on Market Umbrellas (MU)

FY 23 OP PLAN ENTRY: Market Umbrellas/ Beach Umbrellas

DATE OF MEETING: May 11, 2023

LOCATION OF MEETING: Hybrid meeting in-person in Denver and virtual WebEx option

CPSC STAFF FILING MEETING LOG: Andy Newens (ESMC)

FILING DATE: June 2, 2023

CPSC ATTENDEE(S): Andy Newens (ESMC) in-person, Caroleene Paul (ESMC) virtual

NON-CPSC ATTENDEE(S): For the complete list of attendees, contact ASTM

Summary of Meeting:

The F15.79 MU Subcommittee was formed for the purpose of developing safety standards and test methods for market and patio umbrellas that are secured in a weighted/fixed base or stanchion on solid ground. A separate task group was formed to develop a safety standard for beach umbrellas that are installed in or on sand.

Market Umbrellas

The MU Subcommittee did not meet as planned. The date for the next meeting is TBD.

Beach Umbrellas

The Beach Umbrellas (BU) Task Group (TG) continued progress on the draft safety standard for beach umbrellas. CPSC staff presented the results of recent wind tunnel testing to measure the forces on various beach umbrella samples (see attached presentation). Using the resulting data, CPSC staff proposed performance test requirements for the standard. The TG worked on refining and developing the wording of the draft standard document that was previously created and submitted by CPSC staff. The TG agreed that the standard should provide the option of either wind-tunnel-based or laboratory-based testing.

New attendees to the TG, who represented producers/sellers of beach umbrellas or anchor systems, had an opportunity to share/discuss their products and how they can fit into the proposed performance requirements.

Next Steps:

The members of the TG will continue drafting the safety standard with the goal of having it ready for ballot this summer. TG members who are available in the coming weeks will work on writing the sections of the document covering warning labels and safety instructions, and will meet virtually to discuss progress on May 28 and June 5, 2023. The next regularly scheduled virtual meeting of the whole BU Task Group is planned for June 7, 2023.



United States
Consumer Product Safety Commission

CPSC Wind Tunnel Test Results and Discussion

**ASTM F15.79 Beach Umbrellas Task Group Meeting
May 11, 2023**

CPSC Staff:

Caroleene Paul, Andrew Newens, Fred DeGrano, Lawrence Mella, Tom Karalevicz

Disclaimer: This presentation was prepared by CPSC Staff and may not necessarily reflect the views of the Commission.

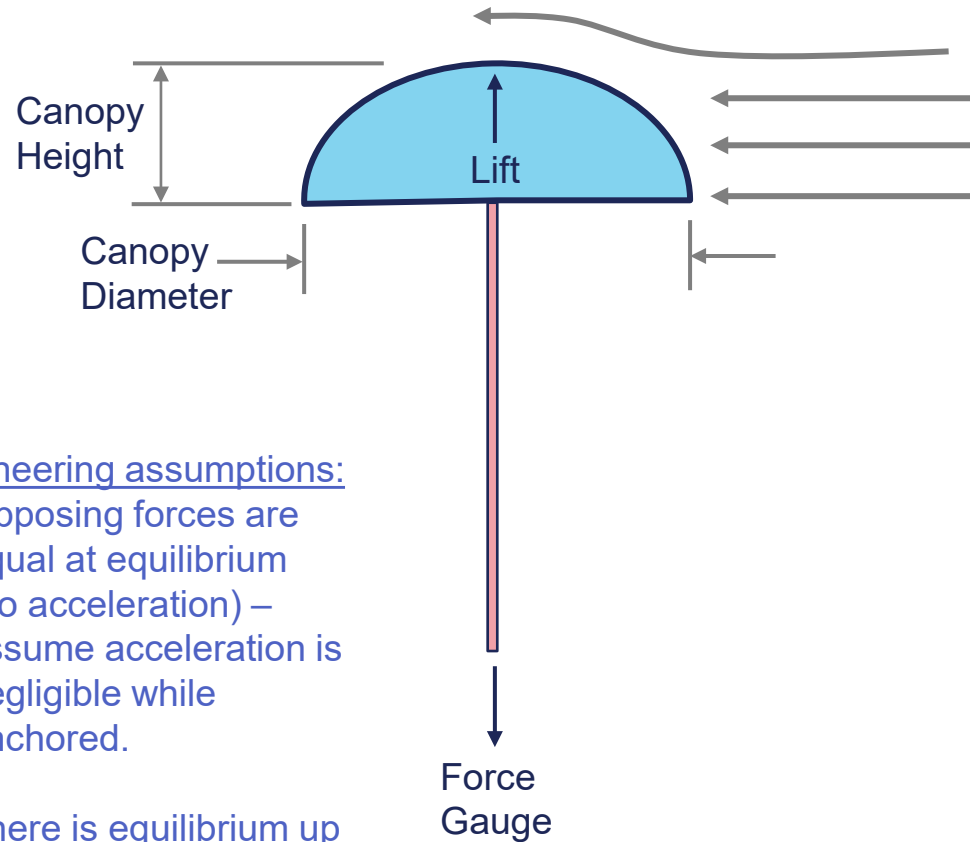
Objective

- To mitigate the hazard of beach umbrellas that detach from sand and strike body part of victim
- CPSC staff is aware of 2 deaths, permanent injuries, and hospitalizations caused by detached umbrellas that struck victims on the beach



Lift Force Measurement

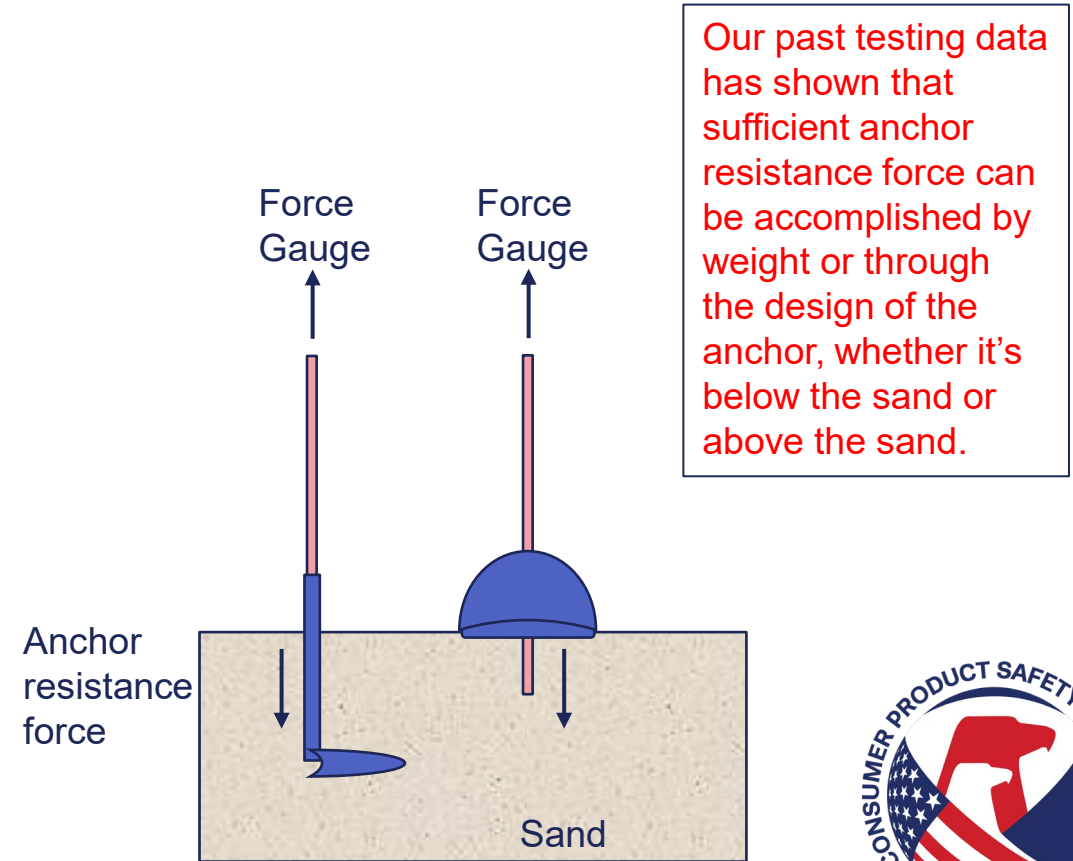
On Canopy



Engineering assumptions:

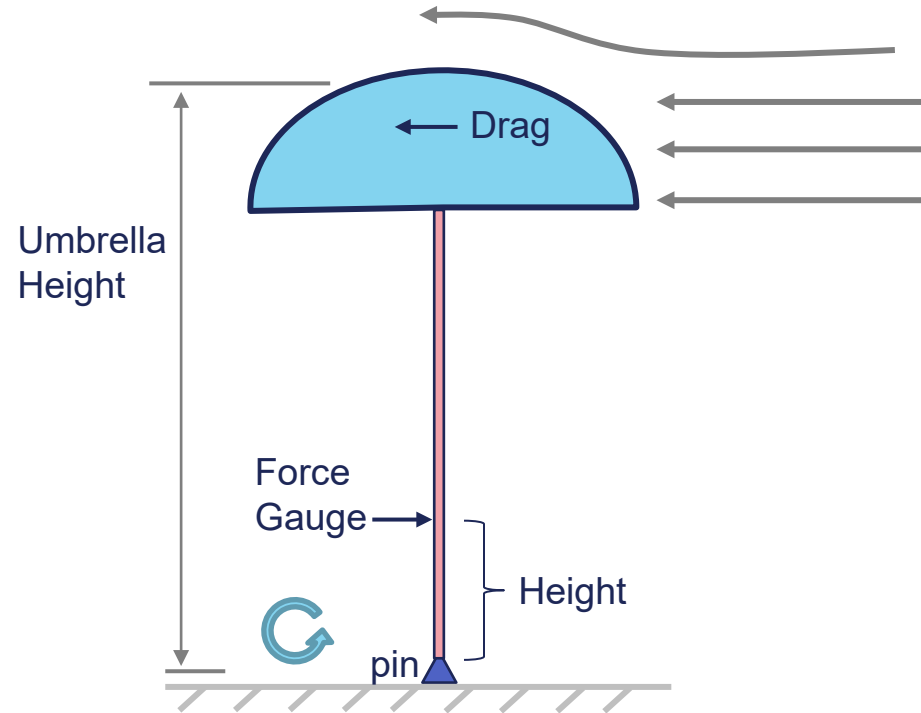
1. Opposing forces are equal at equilibrium (no acceleration) – assume acceleration is negligible while anchored.
2. There is equilibrium up to the moment right before the umbrella is pulled quickly out of the sand.

On Pole/Anchor



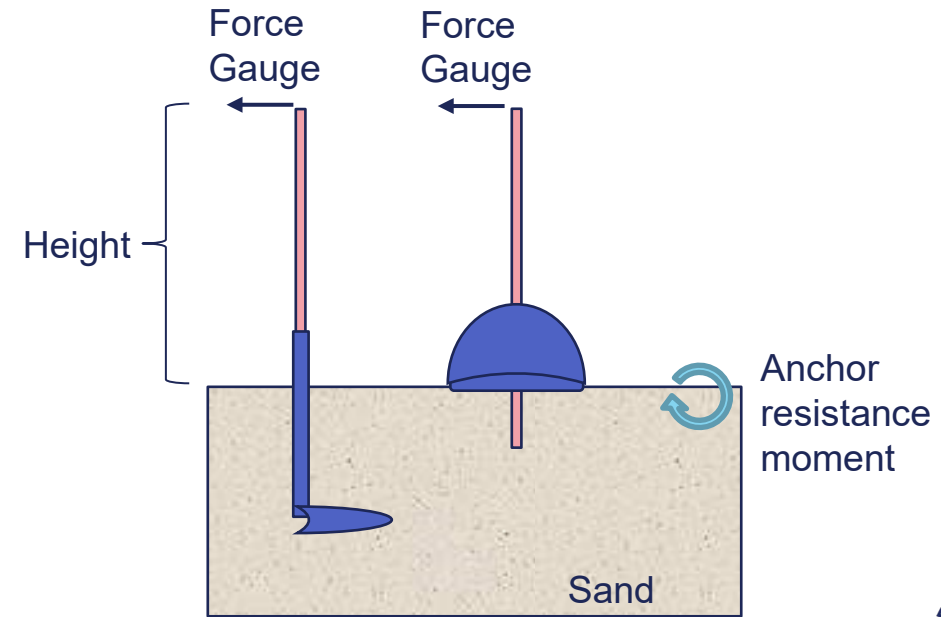
Drag Force Measurement

On Canopy



Wind drag moment = Force x Height

On Pole/Anchor

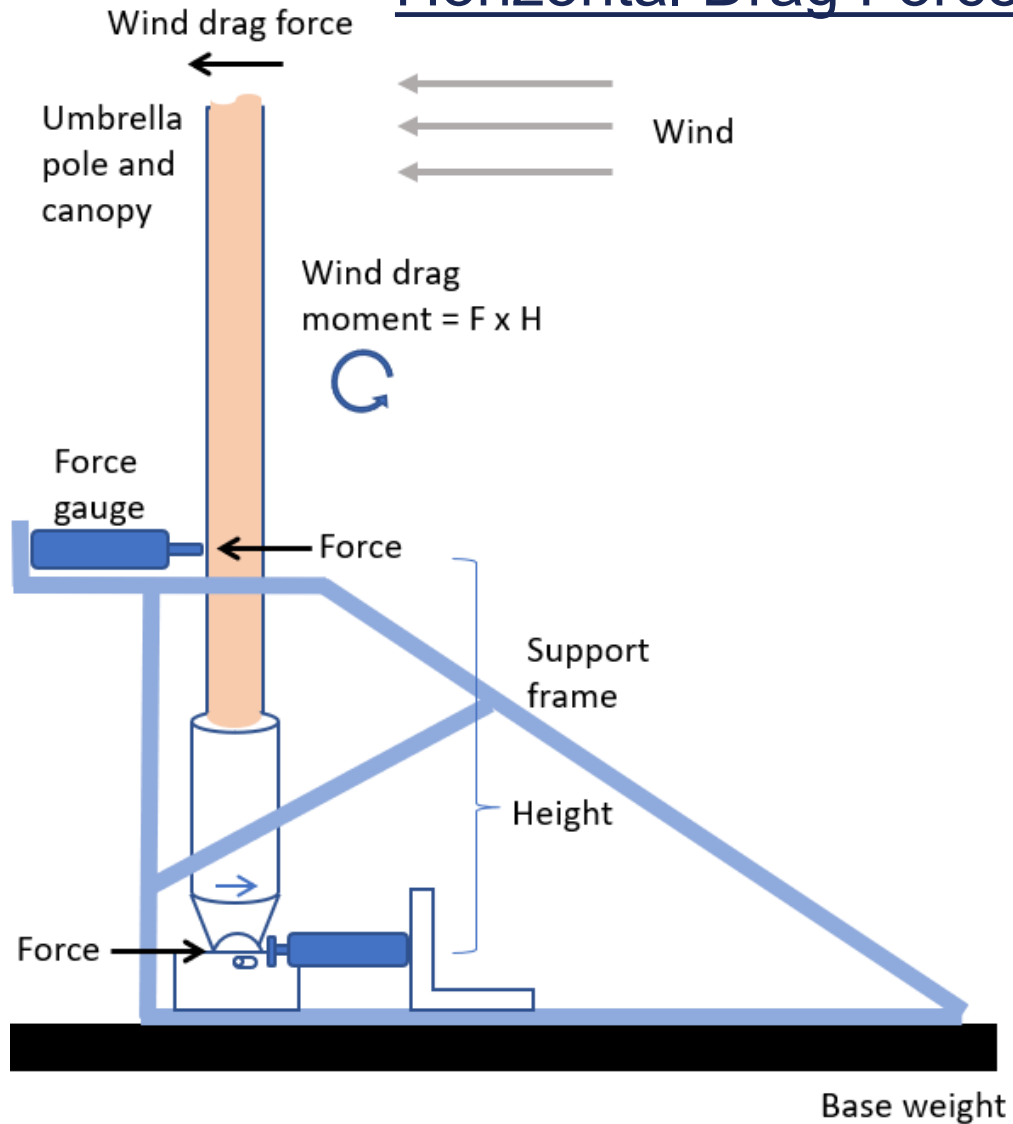


Anchor resistance moment = Force x Height

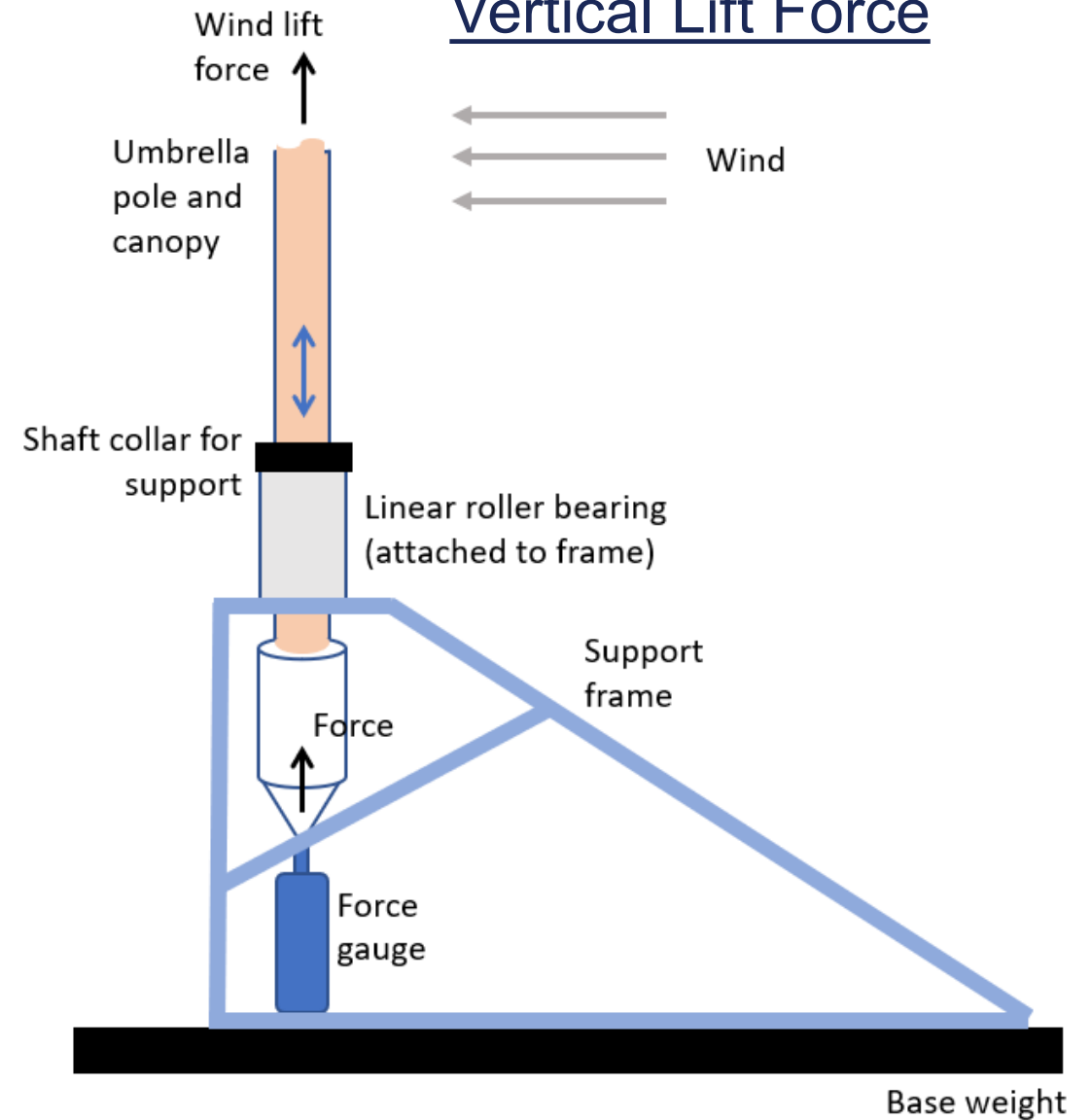


Test fixture/measurement of forces in wind tunnel

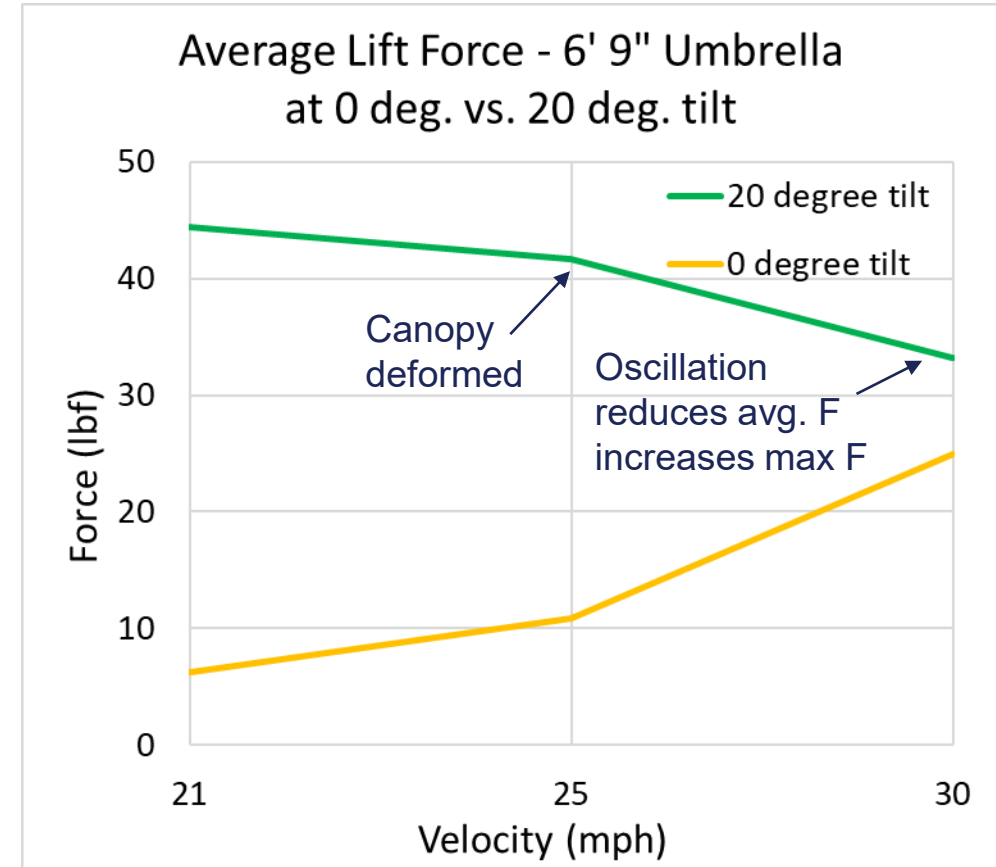
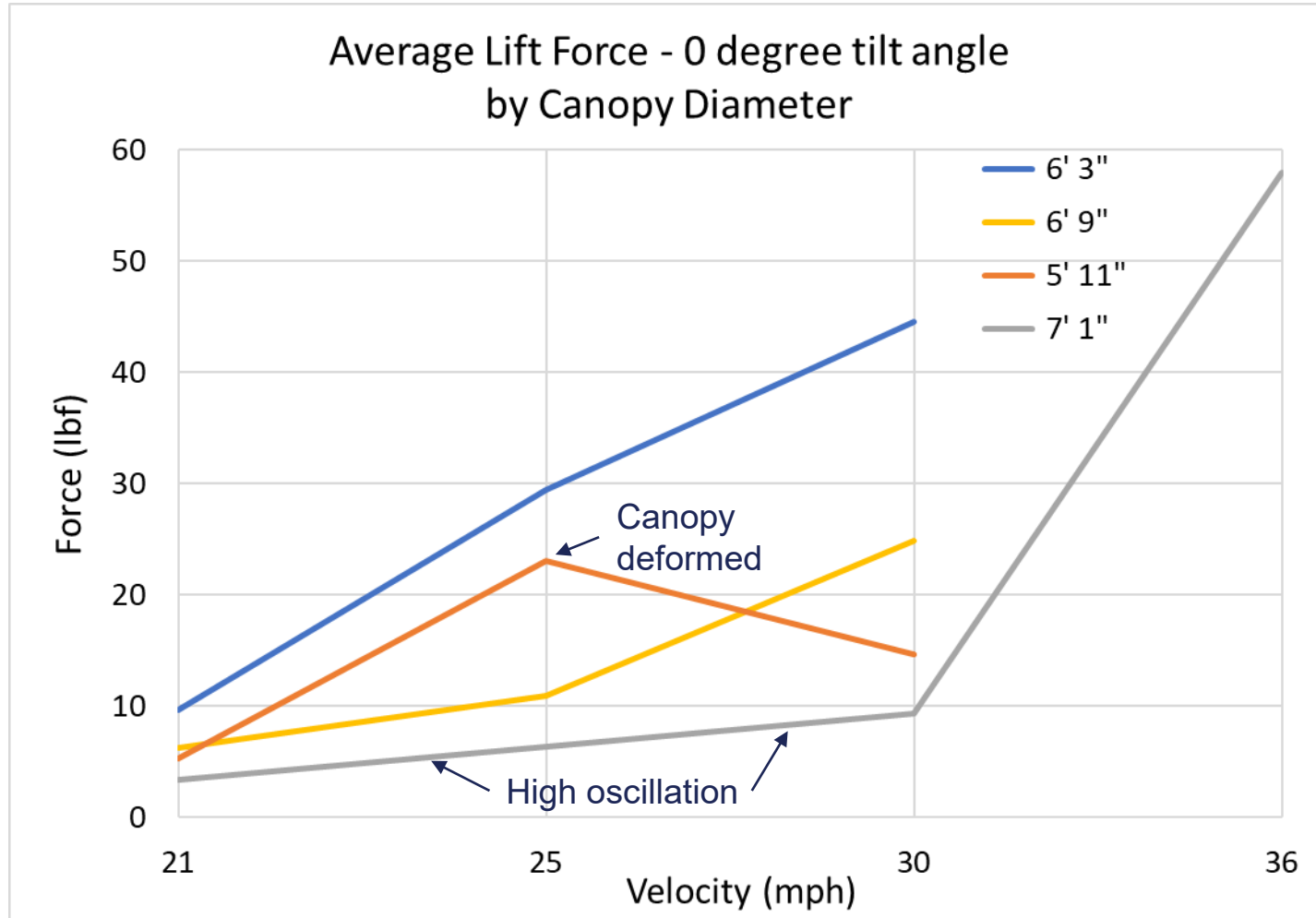
Horizontal Drag Force



Vertical Lift Force



Data from Wind Tunnel Test



- Average lift forces at 30 mph were 10-45 pounds.
- 20-deg. tilt created high lift forces (45-40 pounds) at low wind speeds (21-25 mph) until the canopy deformed.

Wind Tunnel Test Video



(right click to enable video)

Constant
35 mph



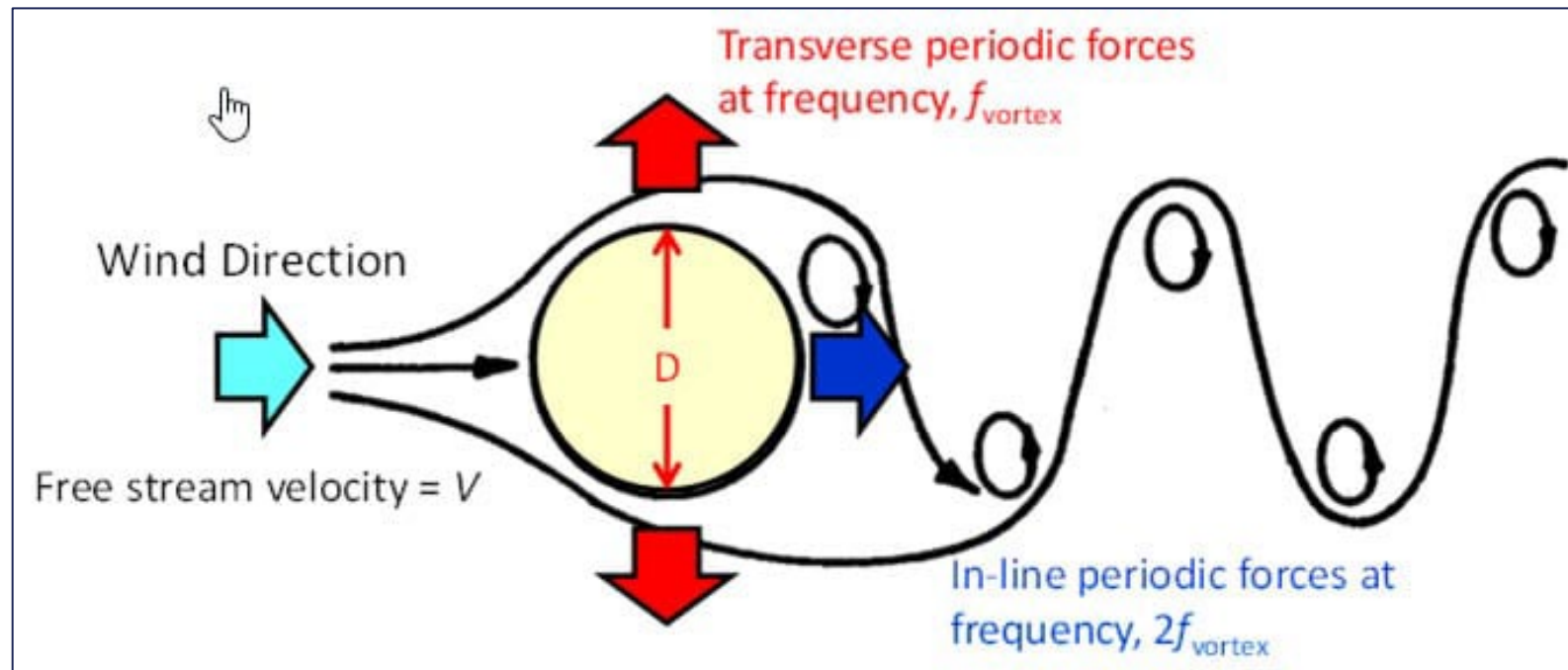
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Oscillation at
23 mph



Wind Tunnel Test Observations

- Maximum average lift forces were between 45 pounds at 30 mph and 58 pounds at 36 mph.
- Mild to significant oscillation that varied with wind speed due to vortex shedding, a common fluid dynamics phenomenon.



Source: <https://www.mecaenterprises.com/take-vortex-shedding-seriously/>



Proposal of Wording for Performance Test

6.1 *Mechanical Test* of Beach Umbrella (BU) Pole/Anchor System

Test Fixture/Sand Box: This test shall be conducted using a 3-foot long by 2-foot wide by 2.5-foot deep (minimum dimensions) container that is filled with coarse-grained sand (ASTM D2487-17).

6.1.1 Install the BU pole/anchor system into the sand in accordance with the manufacturer's instructions. The BU canopy is not needed for this test.

6.1.2 Attach an inclinometer to the BU pole and ensure the pole is standing close to vertical (+/- 3 degrees from vertical).

6.1.3 Apply a horizontal force to displace the pole to an angle of 20-degrees from starting position. *Rationale: This test simulates the degradation in anchor strength of a BU pole/anchor system due to vibration and forces generated by wind drag on the canopy of the BU.*

6.1.4 Apply an upwards force of 75 lb. in-line with the axis of the pole. *Rationale: This test simulates the upward lift force due to a 30-mph wind.*

6.1.5 The BU pole/anchor system shall not come out of the sand after pulling with a constant force for 10 seconds.

Proposal of Wording for Performance Test

6.2 *Wind Tunnel Test* of Beach Umbrella (BU) Pole/Anchor System — 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.

Test Fixture/Sand Box: A 3-foot long by 2-foot wide by 2.5-foot deep (minimum dimensions) container that is filled with coarse-grained sand (ASTM D2487-17).

6.2.1 Install the BU pole/anchor system into the sand (+/- 3 degrees from vertical), in accordance with the manufacturer's instructions, and record the depth to which it is buried in the sand. Open the BU canopy.

6.2.2 A safety tether, such as a metal/security cable shall be connected to the BU and to an immovable object.

6.2.3 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 one (1) minute.

6.2.4 Maintain 30 mph wind speed for 30 minutes.

6.2.5 The BU shall remain attached to the pole/anchor system and shall remain at its original depth in the sand for the duration of the test. The BU pole may tilt up to (TBD) degrees from its original position.

For Reference, Beaufort Scale (Annex to the VS)

Beaufort Number	Description	Speed	Visual Clues and Damage Effects
0	Calm	Calm	Calm wind. Smoke rises vertically with little if any drift.
1	Light Air	1 to 3 mph	Direction of wind shown by smoke drift, not by wind vanes. Little if any movement with flags. Wind barely moves tree leaves.
2	Light Breeze	4 to 7 mph	Wind felt on face. Leaves rustle and small twigs move. Ordinary wind vanes move.
3	Gentle Breeze	8 to 12 mph	Leaves and small twigs in constant motion. Wind blows up dry leaves from the ground. Flags are extended out.
4	Moderate Breeze	13 to 18 mph	Wind moves small branches. Wind raises dust and loose paper from the ground and drives them along.
5	Fresh Breeze	19 to 24 mph	Large branches and small trees in leaf begin to sway. Crested wavelets form on inland lakes and large rivers.
6	Strong Breeze	25 to 31 mph	Large branches in continuous motion. Whistling sounds heard in overhead or nearby power and telephone lines. <u>Umbrellas used with difficulty.</u>
7	Near Gale	32 to 38 mph	Whole trees in motion. Inconvenience felt when walking against the wind.
8	Gale	39 to 46 mph	Wind breaks twigs and small branches. Wind generally impedes walking.

Source:
www.weather.gov/mfl/beaufort



Questions ??

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