

Vibration Dampeners

Wind Induced Vibration

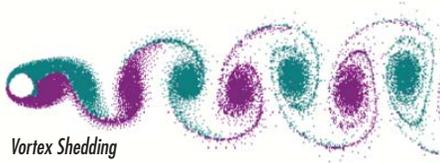
There are two common types of wind-induced vibration observed in poles: First Mode Vibration and Second Mode Vibration (See illustrations to the left).

First Mode Vibration

In first mode vibration, sometimes referred to as sway, the maximum deflection occurs at the top of the pole. First mode oscillation typically occurs at a low frequency of approximately one cycle per second. Normal deflection of this shape usually is not harmful to the pole or luminaire, but first mode oscillating vibration will cause damage and failure.

Second Mode Vibration

Second mode vibration can be the most damaging form of vibration. It occurs approximately at the midpoint of the pole with the deflection off center equal from side-to-side. It occurs at a higher frequency, typically three to six cycles per second. Second mode vibration occurs when the wind synchronizes with the pole's natural frequency of vibration. This is known as resonance. As the steady low level wind moves past the pole, vortices are shed alternately from either side of the structural shaft causing displacement oscillations in a direction perpendicular to that of the wind. Vortices are a swirling motion or pattern of the wind. The most serious situation arises when the vortex-shedding frequency synchronizes with the natural period of vibration in the pole, which can ultimately fatigue the pole to structural failure.

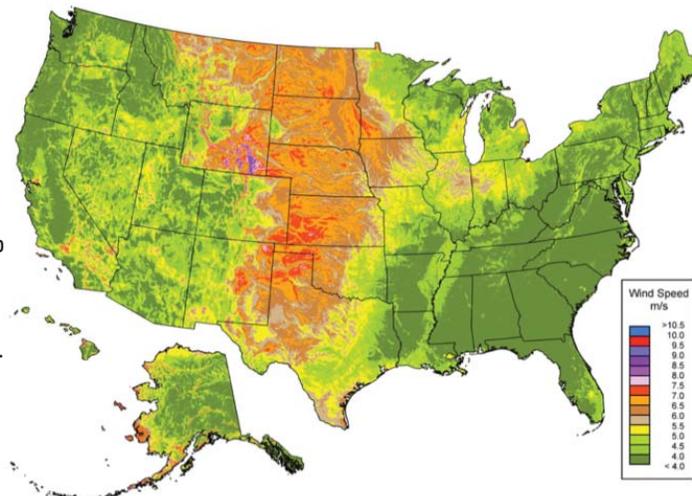


Vortex Shedding

Wind induced vibration can be caused by steady, relatively low-speed wind (10-30 mph), by topography and by the structure to which the pole is mounted or nearby structures. Destructive vibration is not an indication of substandard material, workmanship or design of pole.

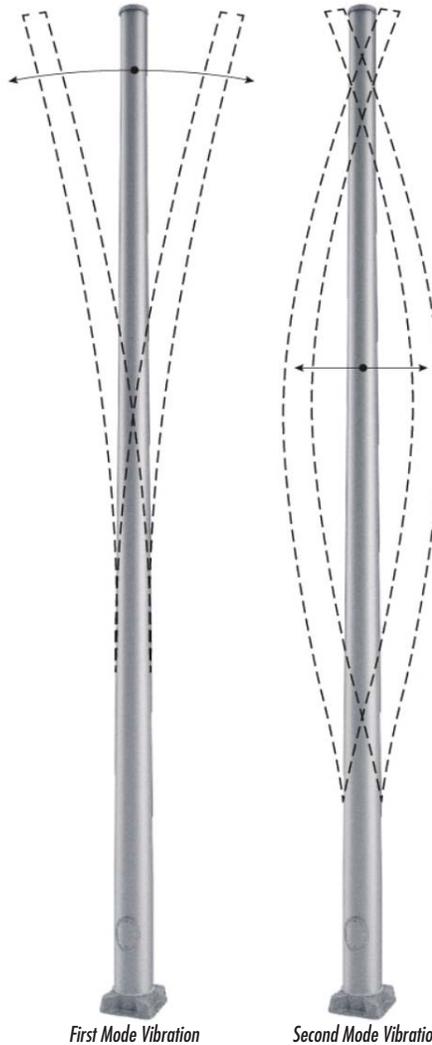
Department of Energy Wind Map

Locations with high average wind speeds are more prone to pole vibration problems than locations with high maximum wind speeds. Areas of high average wind speeds can be identified on the U.S. Department of Energy Residential Scale 30 Meter Wind Map which can be accessed at the U.S. Department of Energy website.



The average wind speeds indicated on this map are model-derived estimates that may not represent the true wind resource at any given location. Small terrain features, vegetation, buildings and atmospheric effects may cause the wind speed to depart from the map estimates. Expert advice should be sought in placing wind turbines and estimating their energy production.

Source: Wind resource estimates developed by AWS Truepower, LLC. Map developed by NREL. Spatial resolution of wind resource data: 2.0 km. Projection: Albers Equal Area WGS84.



First Mode Vibration

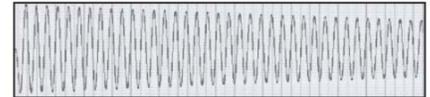
Second Mode Vibration

Vibration Dampeners

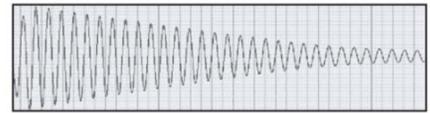
Venture Lighting is proud to offer industry-leading steel poles to coordinate with our area lighting LED luminaires. Venture Lighting has partnered with an industry leader in pole design and manufacturing. Our partner's decades of research and testing has led to the knowledge and background to assure that customers receive the safest, longest lasting pole designs.

To minimize the effects of first or second mode vibration, manufacturers have developed dampers which very effectively quell wind induced vibration of lighting poles.

Free Vibration Test Curves



Free Vibration of Test Pole with No Added Dampening



Free Vibration of Test Pole with Impact Damper

Vibration Dampeners

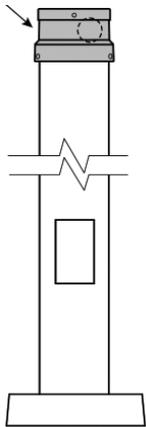
1st Mode Vibration Dampeners

Venture Lighting's pole partner's patented First Mode Vibration Damper is field installed at the top of square poles. This damper very effectively reduces first mode vibration of square lighting poles. Due to potential vibration fatigue issues that can be associated with moderate wind conditions, **First Mode Dampers are recommended for square poles with mounting heights greater than 25' and for square poles with light loading fixtures less than 2.0 EPA.**

First Mode Vibration Damper



First Mode Vibration Damper



First Mode Vibration



2nd Mode Vibration Dampeners

The Venture Lighting's Pole Partner's Second Mode Damper was awarded the industry's first patent in the vibration damping category in 1972.

The Second Mode Dampener is attached to the pole at approximately the midpoint of the pole, and can be factory bolted inside the pole or field mounted on the inside or outside of an existing pole. Based on past experience, some Venture Lighting poles include factory-installed Second Mode Vibration Dampeners as a standard component. **If the poles you intend to order are to be bridge mounted, used as camera poles, or may be subject to unusual site conditions, wide open terrain, steady or high energy prevailing winds, or other site conditions as mentioned, please make Venture Lighting aware of these conditions. Or, if your installed poles are exhibiting oscillation, contact Venture Lighting to pursue a damping solution that may include installing a Venture Lighting Second Mode Damper on the poles.**

Second Mode Vibration Damper



Second Mode Vibration

