AR Products

Solutions for Galloping and Vibration Control

MOD3 Spacer Damper

Galloping Protection for Triple Bundled Conductors

345kV – 500 kV Transmission Lines

Inverted delta configuration is the industry standard for triple bundle design. **Controlling motion by 3-bundle transmission lines is uniquely challenging due to how air flows over individual cables and the wake vortex effects by the top windward sub conductor on the leeward.** Most bundle spacers maintain separation, yet the rigid center of common spacers restricts any independent twisting by the sub conductors – twisting is a proven method to off-load aerodynamic lift. Wind force on the 3-joined sub conductors can lead to vertical amplitude of the mass or rolling of the bundle.

The AR MOD3 technology off-loads aerodynamic lift by changing the wind angle of attack, diminishes wake vortex and resists vertical amplitude by snubbing action.

DESIGN

The asymmetry design of the MOD3 T-spacer bar is central to controlling galloping by the triple bundle. Three articulating clamps allow each sub conductor to twist independently and off-load aerodynamic lift. The eccentric center of gravity at the midpoint of the top 2 sub conductors is designed to absorb the primary compressive and tensile effects of the wind force and dimmish wake effect vortex. The articulating clamps independently cycle through 190° degrees of freedom, which helps enlarges the 18” bundle to 24”- a benefit that raises the critical wind speed at which galloping starts. With the primary galloping control mechanism at the top 2 sub conductors, the lower attachment couples gravity forces with independent twisting to encourage a snubbing action. This resistance to the vertical motion tendencies by the top 2 sub conductors diminishes aerodynamic lift.

APPLICATIONS

Tested to 625kV phase-to-phase, the MOD3 Spacer Damper controls galloping and rolling of the 3-bundled conductor. Installed at specified distances, a MOD3 anti-galloping system provides proper separation of the bundle, increased torsional stiffness, effective vibration damping, and galloping control of triple bundled lines. Galloping control is achieved by allowing each sub conductors to twist independently as each starts to gallop up and down.

Expert engineering customizes the product application and installation to accommodate features of the triple bundled transmission line. Each galloping control system is specified for voltage and conductor by optimizing the spread of the bundle and the size of the clamps that attach to the conductor.

The MOD3 Spacer Damper installs over custom EHV line guards at specified distances forward and back of the structures.

PERFORMANCE TESTED

AR spacer dampers have been in service for more than 20 years and have been tested at NEETRAC for strength, corona, RIV and vibration control. AR Clamps have been strength tested at Helical Line Products. Slipping tests found clamp strength to exceed 4000 lbs. MOD3 Spacer Damper tensile, compressive and range of motion strength tests exceed 5000 lbs.

How it Works

Articulating Clamp Feature. Articulated clamps swivel independently to twist each sub conductor while maintaining separation of the bundles. The design provides stress relief in three degrees of freedom in high-frequency Aeolian vibration and low-frequency galloping

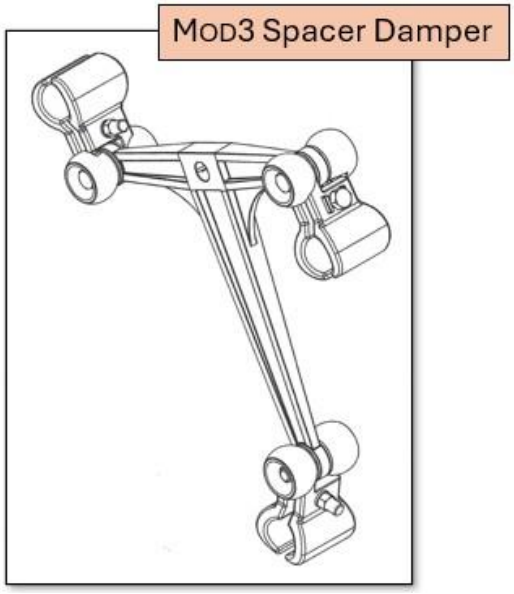
Increased Torsional Stiffness of the Line. How the spacer dampers are attached along the line creates increased stiffness of the bundle for control of both galloping and rolling.

Strength. A T-spacer bar assures compressive and tensile strength of the unit. MOD3 laboratory testing revealed compressive strength exceeding 10,000 lbs.

Galloping Control. The twisting feature of AR Product line controls galloping motion to safe limits. More than merely reducing or synchronizing the motion, the MOD3 acts to arrest galloping as it is induced. The large rotation angles effectively change the wind angle of attack during galloping, a proven technology and method.

Specifications

- Dimensions | extended — 25.5"W x 22.6L x 4.4"D
- Mechanical Ratings — 11000 lbs. Rated Tensile Strength T-bar
  4000 lbs. Clamp Holding Strength
  5000 lbs. ASSY Tensile and Compressive Strength
- Materials — Aluminum Alloy A356-T6
- Articulating Clamps — 7 sizes scaled for conductor sizes with OD ranging <1.0 to 1.80
- Total Weight — 15 lbs.



Construction and Impact on the Line

MOD3 Spacer Dampers are constructed to A356-T6 per ASTM B26 standards, weight and strength. There is minimal structural loading on the line because of its low profile, compact design and weight. Three clamps are positioned at equal 18" distances with an eccentric center of gravity to absorb primary wind force. Distance between the clamps is maintained by the T-spacer bar. In galloping winds, the articulating clamps extend reach to 24" while independently twisting each sub conductor. Enlarged bundles have been shown to delay the critical wind speed at which galloping commences.

The smooth outer edges of the AR Clamps and the recessed placement of hardware guard against corona. The inner surfaces of the clamp grip without slip and flexibility in aluminum line guard choices makes the MOD3 Spacer Damper suitable for a range of line voltages and conductor sizes.

For more information *info@arproducts.org*