

Recommendations for Electrical Stress Reduction on the PowerGuide®TR All Dielectric Self-Supporting Cable

This application note addresses issues associated with installing the PowerGuide®TR all-dielectric self-supporting (ADSS) cable in high voltage applications. Stresses derived from the electrical field can cause electrical arcing and/or corona discharge at the ends of the metallic cable support hardware. OFS Fitel, LLC categorizes high voltage applications as tower configurations with conductor voltages 69 kV and above. The two most significant electrical stress mechanisms are dry band arcing and corona.

Tracking Resistant Jacketing Materials

The space potential has been the adopted value, which gives a relative measure of the possibility of electrical stress mechanisms occurring on the jacketing material. The space potential is a measure of the voltage induced by the phase conductors viewed at the ADSS cable attachment point.

Under normal operating conditions, it has been determined that all-dielectric fiber optic cables with polyethylene sheaths are not adversely effected by space potential values up to 12 kV. This has been established from both testing and field experience. For space potentials from 12 kV to 25 kV and environments where the cable will be exposed to heavy pollution and contaminants, OFS Fitel, LLC recommends a cable with an engineered polyolefin jacket specifically designed to withstand the thermal effects associated with dry band arcing. This jacketing material has proven an effective deterrent to dry band arcing in both experimental and real world applications.

In determination of space potential and specific jacket recommendations, OFS Fitel, LLC will consider the application specific information to be supplied by the user. This may include conductor voltages, proximity of ADSS to conductors, conductor phasing, shield wires, cable diameters, pole type and pollution levels.

Corona Mitigation Devices

Corona occurs when the voltage gradient in the immediate vicinity at armor rod tips exceeds the breakdown strength of air. Corona discharge occurs at the ends of the armor rods used in suspension and dead-end hardware for the PowerGuide® ADSS cable. Corona discharge may lead to cable jacket degradation. Corona onset surface gradients depend on armor rod tip alignment, elevation, and contamination levels. Corona has been demonstrated in the laboratory in space potential fields as below as 16.2 kV and is likely above 20 kV.

Several manufactures offer a corona coil device that reduces or delays the onset and probability of corona discharge occurring at the hardware attachment. OFS Fitel, LLC recommends the use of corona coils in all tracking resistant applications where the space potential voltage is 12 kV or higher. A properly installed corona coil should increase the onset space potential voltage to above 30 kV. Consult with OFS Fitel, LLC or the appropriate hardware manufacturer for specific test results and placement/installation issues.

Additional Technical References

- For calculation of space potential see Application Note 203, “Space Potential Calculation”
- For additional details of dry band arcing and corona discharge see Application Note 810, “Electrical Stress Mechanisms”.
- For electrical testing results on the tracking resistant PowerGuide® cable see Application Note 803, “Electrical Testing on the PowerGuide® ADSS Cable”