Wildfire Mitigation



Avoid Arcs and Ignition

Benefit from Covered Conductors

Utilize Flame Retardant Insulators

https://www.marmonutility.com/wildfiremitigation/



Help Prevent Wildfires With Hendrix

Devastating wildfires ravage the dry climate in western North America every year and cost billions of dollars every year across the United States. Power lines are one potential risk when it comes to wildfire ignition and Hendrix provides the solution to mitigating that risk through innovative product and system design.

Options for Power Line Wildfire Mitigation

Underground power cable systems are the best possible way to mitigate wildfires from a utility perspective. Aesthetically, they are out of sight and practically, they do not risk contact with trees and vegetation. However, underground systems have one major downside; cost. When budget is an issue, overhead alternatives may be sought out in areas with high wildfire risk. Hendrix provides multiple aerial cable options that can greatly reduce the risk of wildfire ignition especially when compared to typical bare wire power line configurations. This includes covered conductor in both tree wire and spacer cable configurations as well as flame retardant (FR) insulators.



Wildfire Mitigation Effectiveness

In 2019, Southern California Edison (SCE) evaluated three power line construction methods: re-conductoring with bare wire, re-conductoring with covered conductor, and converting to underground. They compared costs per mile, mitigation effectiveness, and mitigation-to-cost ratios. The results are shown in the table below.

Mitigation Option	Relative Mitigation Effectiveness Factor	Cost per Mile (\$ million)	Mitigation Cost Ratio
Re-conductor Bare	0.15	0.30	0.50
Re-conductor Covered	0.60	0.43	1.40
Underground Conversion	1.00	3.00	0.33

Covered Conductor

Covered conductors can be utilized in both tree wire systems (similar to bare wire construction) and spacer cable systems.

Covered conductor provides a range of benefits when in relation to wildfire mitigation. The protective HDPE cover is not subject to flashovers as bare wire is, mitigating a potential ignition source. Even if the line comes into contact with trees or branches, ignition will not result. In the case of conductor clashing in high wind scenarios, covered conductor will not cause arcing or sparks. Furthermore, the cover protects the AAC from physical damage that is a possibility with some of the pre-annealed conductors supported on steel or carbon fiber cores.

Additional benefits include a system that is overall friendlier to wildlife, avoiding unnecessary outages caused by animal contact with the system. Finally, covered conductor provides near underground reliability with the benefit of lower labor, planning and equipment costs (check table on page 1).



In **30%** of cases when a power line falls to the ground, there isn't enough current to activate a protective device (recloser/relay/fuse). This is known as a high impedance fault and can lead to ignition of dry brush on the ground. As opposed to bare wire, **covered conductor** can prevent the ignition even if a high impedance fault occurs and minimizes the risk of a wildfire.

Fire Retardant Insulator Testing

In addition to being tested according to UL-94, a "field" burning test was conducted using a Hendrix FR Insulator. The test consisted of directly applying the flame of a utility torch to the thinnest section (~1/8") of the insulator's fin for a duration of 30 continuous seconds.

Results:

- The flame was self-extinguished within 5 seconds of the torch being removed
- The burning drops self-extinguished and did not ignite the cotton balls placed 2ft below the insulator.



Fire Retardant Insulators

One strategy for wildfire mitigation includes the use of Fire Retardant (FR) Insulators. Polyethylene has an ignition temperature of about 650°F, and while wildfires can reach temperatures far above that threshold in the ranges of 1,100°F - 2,000°F, FR Insulators will still be less prone to ignition.

Anything on the system that could serve as additional fuel for a potential wildfire carries an increase in risk. FR Insulators are designed to selfextinguish as soon as the flame is removed; this will prevent the insulator from depositing flaming drops down onto any ignitable material below, potentially increasing the spread of the fire. Hendrix FR Insulators are tested according to UL 94, in which the material passes vertical burning V-0, which is the most stringent rating for UL 94.



*Before and after of the test described above on a Hendrix FR Insulator



High Temperature Insulators

Hendrix insulators are molded from a proprietary track and UV resistant gray highdensity polyethylene (HDPE) blend. They are more reliable than traditional porcelain insulators offering a range of benefits including lighter weight, safer installation, vandalism resistance, durability and recyclability.



High Temperature (HT) Insulators are made from a specialized HDPE blend that makes them capable of operating at 200°C Maximum Continuous Conductor Temperature when factored with the amount of mechanical loading applied. In systems where conductors suffer from high heat, HT insulators excel at delivering a solution that carries all the benefits of an HDPE insulator and avoids potential ignition.





Wildfire Mitigation

Hendrix Aerial Cable Systems provide the ultimate solution to wildfire ignition risks posed by overhead power lines. Typical bare wire configurations carry risks of tree or debris (branches, twigs, etc.) coming in contact with the line and causing outages or potential ignition; the covered conductor offered in Hendrix systems nullifies this issue and will ensure a more reliable and safer system. When paired with the use of specialty made Fire Retardant or High Temperature Insulators, utilities can further safeguard the system depending on existing wildfire or temperature risks surrounding the system.

Hendrix provides fully supported aerial cable distribution and transmission solutions for 15kV, 25kV, 35kV, 46kV, 69kV, 115kV, and 138kV.

Hendrix aims to mitigate the threat of power line-caused wildfires by providing exceptionally robust, reliable and safe systems that circumvent causes of potential outages or ignition.

> *The curve shows the point where temperature and mechanical load combinations result in <1/8" neck indentation - after 8 hours of continuous operation. (Tests conducted with 795 KC-mil, compressed, bare, aluminum conductor)

Note: Results will vary based on conductor size and strand type





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