

Wildfire Mitigation

15kV-138kV



Wildfire Risk Reduction ◀

Avoid Arcs and Ignition ◀

Gain advantages with Covered Conductors ◀

Implement Flame Retardant Insulators ◀

 **Hendrix**[®]

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Help Prevent Wildfires With Hendrix

Each year, devastating wildfires sweep through the arid northwest region of the United States, causing billions of dollars in damage in their wake. Power lines pose a major risk as a wildfire ignition source and have been the cause of some of the most destructive wildfires in United States history. Hendrix provides utilities with 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 a concern, covered conductor provides a great solution for areas with high wildfire risk.

Hendrix provides multiple aerial cable options that greatly reduce the risk of wildfire ignition especially when compared to typical bare wire power line configurations. This includes covered conductor solutions in both tree wire and spacer cable configurations as well as the implementation of Fire Retardant (FR) and High Temperature (HT) Insulators.



Wildfire Mitigation Effectiveness

In 2019, Southern California Edison (SCE) evaluated three power line construction methods for their effectiveness in mitigating fire risks: 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

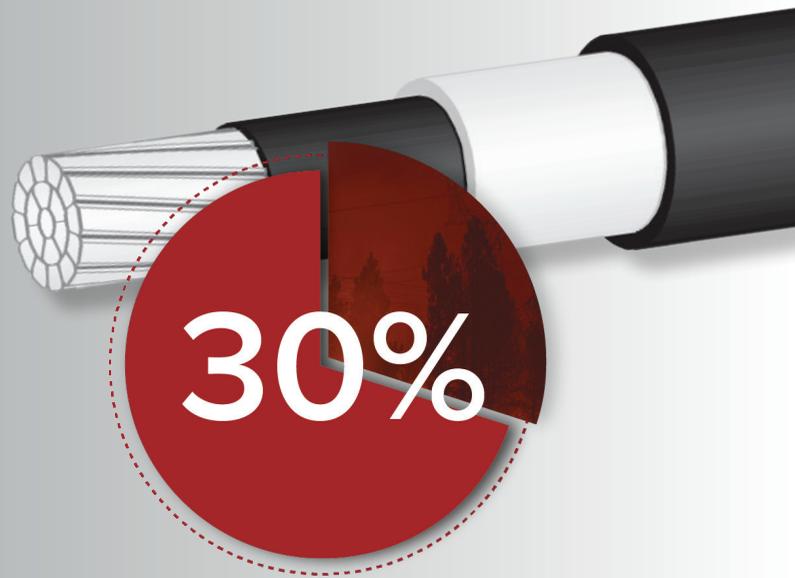


Covered Conductor

Covered conductors are utilized in both tree wire systems (similar to bare wire constructions) and spacer cable systems. Covered conductors offer several advantages over bare wires, providing exceptional performance in wildfire mitigation

The protective high-density polyethylene (HDPE) cover is not subject to flashovers like bare wire is, mitigating a potential ignition source. Even if the line comes into contact with trees or branches the HDPE covering protects the wire and eliminates any sparking and chances of ignition. In the event of conductor clashing due to high winds, the protective covering acts to prevent any arcing or sparks. Furthermore, the covering protects the conductor from physical damage that bare wire systems often experience.

Additional benefits include a system that is avian and wildlife friendly and therefore significantly reduces unnecessary outages caused by animals. Finally, covered conductor provides near underground reliability with the benefits of reduced labor, planning and equipment costs (check table on page 1).



In **30%** of cases when a bare wire 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. **Covered conductors** prevent the ignition even if a high impedance fault occurs and greatly minimize the risk of a wildfire.

Fire Retardant Insulators

Another strategy for bare wire lines is to utilize Fire Retardant (FR) insulators. While the ignition temperature for polyethylene (~650°F/~350°C) is below the temperatures wildfires often reach (1,100°F – 2,000°F/600°C – 1,100°C), they 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 self-extinguish 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 and achieve the most stringent rating, passing the vertical burning V-0 classification.



Fire Retardant Insulator Testing

Hendrix polymer insulators are not only compliant with UL 94 safety requirements, but we also conducted field burning tests to ensure superior performance. 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.



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

High Temperature Insulators

Hendrix insulators are molded using a proprietary, gray, track and UV resistant high-density 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 approximately 390°F (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 while avoiding potential ignition.

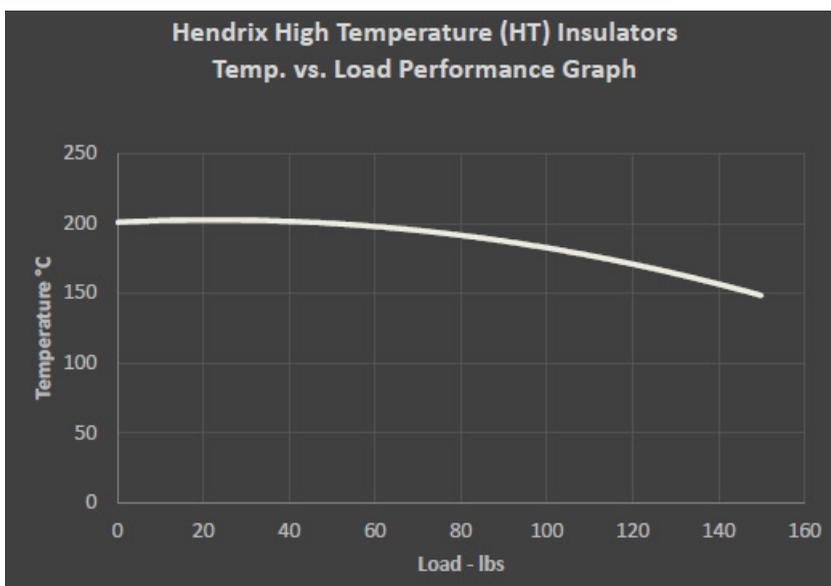


Wildfire Mitigation

Hendrix Aerial Cable Systems provide the ultimate solution to wildfire ignition risks posed by overhead power lines. Typical bare wire configurations carry risks of trees 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 (including complete circuit design, on-site training and project management) 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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DO YOUR PART IN MITIGATING
UTILITY WILDFIRE RISKS



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