

FR-NP™

Flame Resistant – Non-Propagating Covered Conductor

The 2018 wildfires that were devastating the lives and livelihood of the people across California put a spotlight on the need for a covered conductor as a method for utility companies to reduce fires. Many sought current commercially developed covered conductor known as Spacer Cable or Tree Wire. The flaw with all other spacer cables on the market is that they are not flame resistant and are generally made with thermoplastic or cross-linked polyethylene materials. Standard thermoplastic and cross-linked polyethylene do not have any flame resistance and burn readily. When fire is introduced to a standard spacer cable the fire spreads along the cable and flaming particles drop from the cable. The horizontal propagation and melted flaming jacket material dripping down from the cable easily causes secondary fires, and enhances the spread of the original fire especially in rural and wooden areas.



Priority Wire & Cable's patented Flame Resistant Non-Propagating (FR-NP™) Covered Conductor was invented in order to prevent horizontal flame propagation along transmission lines. The FR-NP™ spacer cable eliminates the spread of fires along transmission lines, which reduces the secondary fires caused by the propagation and dripping flaming material. This allows utilities to restore power to communities impacted by fire much faster since the amount of line replacement needed is greatly decreased. Another benefit of FR-NP™ is it enables utilities to maintain their power supply much longer during a fire.

While putting together their Wildfire Mitigation Plans, utilities should ask themselves a basic question. Why would you replace wooden poles and wooden cross arms that contribute to fires with fire resistant fiberglass, but install covered conductor that catches fire, burns, drips flaming particles to the ground and propagates along the line? The utility may not be responsible for starting a wildfire, but they should be concerned that their lines contributed to expanding the (possibly containable) fire into a possible wildfire.

Construction

Our new FR-NP™ Spacer Cable is constructed with flame resistant materials in the outer layer of the covering, while still meeting the challenge of maintaining 100% bonding to the substrate material and the needed physical and dielectric properties.

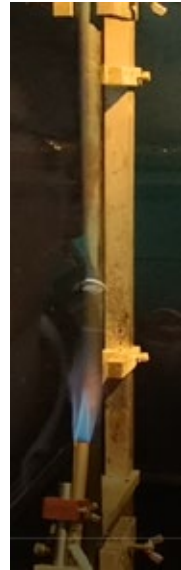
Priority Wire's patented FR-NP™ cable is **flame resistant and self-extinguishing** under typical wildfire conditions and is formulated using a special jacketing material that meets environmental, physical and dielectric property challenges. It also has successfully passed and exceeded the Underwriters Laboratories (UL) vertical flame tests FT1 and VW-1 and horizontal flame test FT2.

- It can be installed as Tree Wire.
- There is no change in the current installation of covered conductors and can minimize cost.
- It also can be installed in a Spacer Cable system to upgrade the fire protection of the system.

FR-NP™ Performance Testing

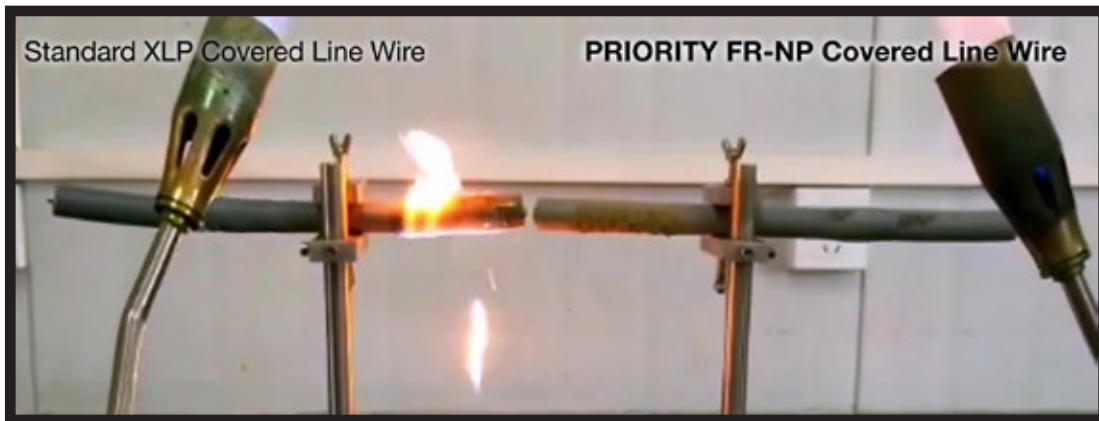
In order to ensure the **flame resistant** capacity of the cable, it was tested under the following conditions.

Setup: the cable was secured vertically in a draft free chamber and a burner was used to apply the flame and was secured at an angle of 20° to the vertical cable, per UL 2556 section 9.3 and 9.4.



Flame Resistance Testing		
Test 1: FT1/VW-1	Results	Pass/Fail
5 cycles of flame application for 15 seconds, with a break of 15 seconds	Cable did not burn during or after the 5 flame applications	Pass

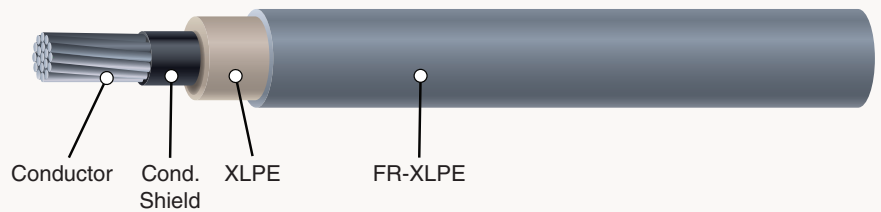
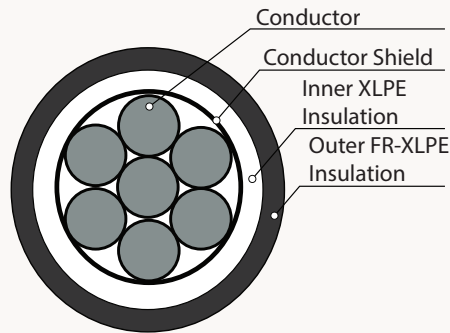
Test 2: Exceeding FT1	Results	Pass/Fail
5 cycles of flame application for 30 seconds, with a break of 15 seconds	Cable self-extinguished	Pass



Evolution of Covered Line Wire - Features Comparisons

Installation, Safety & Operation Considerations	Tree Wire	Covered Line Wire Spacer Cable™		Covered Line Wire FR-NP™
Type of Insulation Material	Thermoplastic	Thermoplastic	Thermoset	Thermoset
Year of Development	1940's	1954	2016	2018
Rugged/Inaccessible Land	√	√	√	√
Improved Storm Damage Restoration Time	√	√	√	√
Protection from Branches & Foliage	√	√	√	√
Animal Contact Safety	√	√	√	√
Harsh Weather Withstand	√	√	√	√
Reduced Dielectric Stress		√	√	√
Environmental Thermal Stability			√	√
Operating Temperature 90°C			√	√
Flame Resistant, Minimizing Vegetation Management				√
No Fire Propagation, Self-extinguishing				√
No Dripping Flaming Material, Minimizing Secondary Fire Risk				√
Survivability, Faster Power Restoration after Fire				√

FR-NP™ Flame Resistant Non-Propagating Spacer Cable (Tree Wire) AAC, ACSR, AAAC XLPE/FRXLPE (15kv-35kv rated)



Application: Flame Resistant Covered/Conductor/Spacer Cable is designed for use in primary and secondary overhead distribution where there is limited space available for rights of way, and where fire hazards are concerns. In case tree limbs or other objects come in contact with conductors, the flame resistant outer covering will effectively prevent direct shorts and instantaneous flashovers. The insulating properties of the covering layers allow for the cable system to be bundled into a compact area. The resulting close-proximity configuration minimizes the amount of space and hardware required for line installation effectively solving most right-of-way-problems. In case of a fire, the flame resistant wire will eliminate the spread of fires along transmission lines, which reduces the secondary fires caused by the propagation and dripping flaming material.

Conductors: Stranded hard drawn AAC, AAAC, or ACSR conductors. A semi-conducting tape may be applied over conductor as needed.

Strand Shield: Semi-conducting Cross-linked Polyethylene, black

Inner Covering: Cross-linked polyethylene (XLPE), natural

Outer Covering: Flame, sunlight and track resistant cross-linked polyethylene (XLPE), black or gray

Standards: ICEA: S-121-733 Tree Wire and Messenger Supported Spacer Cable
ASTM: B230, B231, B232, B398, B399, B400, B498
UL 2556 Flame Test FT1/VW-1, FT2



FR-NP™ Flame Resistant Non-Propagating Spacer Cable (Tree Wire) AAC XLPE/FRXLPE (15kv-35kv rated)

Conductor Size	Min. Number of Strands*	Stranding Type	Conductor Diameter	Conductor Shield Thickness	Inner Covering Thickness	Outer Covering Thickness	Finished Cable Diameter	Cable Weight	Rated Strength
AWG/kcmil			inches	inches	inches	inches	inches	lbs/kft	lbs
AAC Conductors-15kV									
2	7	Round	0.292	0.015	0.075	0.075	0.622	191	1112
1/0	7	Compact	0.336	0.015	0.075	0.075	0.666	238	1791
2/0	7	Compact	0.376	0.015	0.075	0.075	0.706	274	2259
3/0	7	Compact	0.423	0.015	0.075	0.075	0.753	319	2736
4/0	18	Compact	0.475	0.015	0.075	0.075	0.805	374	3447
266.8	18	Compact	0.537	0.015	0.075	0.075	0.867	442	4473
336.4	18	Compact	0.603	0.015	0.075	0.075	0.933	524	5535
397.5	18	Compact	0.659	0.015	0.075	0.075	0.989	595	6399
477	35	Compact	0.722	0.015	0.075	0.075	1.052	686	7524
556.5	35	Compact	0.780	0.020	0.075	0.075	1.130	798	8946
636	35	Compact	0.835	0.020	0.075	0.075	1.185	887	10260
715.5	58	Compact	0.897	0.020	0.080	0.080	1.267	1000	11790
795	58	Compact	0.932	0.020	0.080	0.080	1.302	1084	12510
AAC Conductors-25kV									
2	7	Round	0.292	0.015	0.125	0.125	0.822	315	1112
1/0	7	Compact	0.336	0.015	0.125	0.125	0.866	369	1791
2/0	7	Compact	0.376	0.015	0.125	0.125	0.906	412	2259
3/0	7	Compact	0.423	0.015	0.125	0.125	0.953	464	2736
4/0	18	Compact	0.475	0.015	0.125	0.125	1.005	527	3447
266.8	18	Compact	0.537	0.015	0.125	0.125	1.067	605	4473
336.4	18	Compact	0.603	0.015	0.125	0.125	1.133	698	5535
397.5	18	Compact	0.659	0.015	0.125	0.125	1.189	779	6399
477	35	Compact	0.722	0.015	0.125	0.125	1.252	879	7524
556.5	35	Compact	0.780	0.020	0.125	0.125	1.330	1004	8946
636	35	Compact	0.835	0.020	0.125	0.125	1.385	1102	10260
795	58	Compact	0.932	0.020	0.125	0.125	1.482	1293	12510

All values are nominal and subject to correction

*The minimum number of wires refers to the structure of Class A or B in ASTM B231 and B400.

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FR-NP™ Flame Resistant Non-Propagating Spacer Cable (Tree Wire) AAC XLPE/FRXLPE (15kv-35kv rated)

Conductor Size	Min. Number of Strands*	Stranding Type	Conductor Diameter	Conductor Shield Thickness	Inner Covering Thickness	Outer Covering Thickness	Finished Cable Diameter	Cable Weight	Rated Strength
			inches	inches	inches	inches	inches	lbs/kft	lbs
AAC Conductors-35kV									
1/0	7	Compact	0.336	0.015	0.175	0.125	0.966	437	1791
2/0	7	Compact	0.376	0.015	0.175	0.125	1.006	482	2259
3/0	7	Compact	0.423	0.015	0.175	0.125	1.053	538	2736
4/0	18	Compact	0.475	0.015	0.175	0.125	1.105	604	3447
266.8	18	Compact	0.537	0.015	0.175	0.125	1.167	686	4473
336.4	18	Compact	0.603	0.015	0.175	0.125	1.233	783	5535
397.5	18	Compact	0.659	0.015	0.175	0.125	1.289	867	6399
477	35	Compact	0.722	0.015	0.175	0.125	1.352	972	7524
556.5	35	Compact	0.780	0.020	0.175	0.125	1.430	1102	8946
636	35	Compact	0.835	0.020	0.175	0.125	1.485	1204	10260
795	58	Compact	0.932	0.020	0.175	0.125	1.582	1401	12510

All values are nominal and subject to correction

*The minimum number of wires refers to the structure of Class A or B in ASTM B231 and B400.

FR-NP™ Flame Resistant Non-Propagating Spacer Cable (Tree Wire) AAAC XLPE/FRXLPE (15kv-35kv rated)

Conductor Size	Min. Number of Strands*	Stranding Type	Conductor Diameter	Conductor Shield Thickness	Inner Covering Thickness	Outer Covering Thickness	Finished Cable Diameter	Cable Weight	Rated Strength
			inches	inches	inches	inches	inches	lbs/kft	lbs
AAAC Conductors-15kV									
123.3	7	Round	0.398	0.015	0.075	0.075	0.728	271	3843
155.4	7	Round	0.447	0.015	0.075	0.075	0.777	314	4851
195.7	7	Round	0.502	0.015	0.075	0.075	0.832	367	6111
246.9	7	Round	0.563	0.015	0.075	0.075	0.893	430	7704
312.8	19	Round	0.642	0.015	0.075	0.075	0.972	521	9450
394.5	19	Round	0.721	0.015	0.075	0.075	1.051	619	11970
465.4	19	Round	0.783	0.015	0.075	0.075	1.113	702	14040
559.5	19	Round	0.858	0.020	0.075	0.075	1.208	834	16920
AAAC Conductors-35kV									
123.3	7	Round	0.398	0.015	0.175	0.125	1.028	484	3843
155.4	7	Round	0.447	0.015	0.175	0.125	1.077	538	4851
195.7	7	Round	0.502	0.015	0.175	0.125	1.132	603	6111
246.9	7	Round	0.563	0.015	0.175	0.125	1.193	681	7704
312.8	19	Round	0.642	0.015	0.175	0.125	1.272	793	9450
394.5	19	Round	0.721	0.015	0.175	0.125	1.351	908	11970
465.4	19	Round	0.783	0.015	0.175	0.125	1.413	1005	14040
559.5	19	Round	0.858	0.020	0.175	0.125	1.508	1159	16920

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*The minimum number of wires refers to the structure of Class AA or A in ASTM B399.

FR-NP™ Flame Resistant Non-Propagating Spacer Cable (Tree Wire) ACSR XLPE/FRXLPE (15kv-35kv rated)

Conductor Size	Number of Strands	Conductor Diameter	Conductor Shield Thickness	Inner Covering Thickness	Outer Covering Thickness	Finished Cable Diameter	Cable Weight	Rated Strength
AWG/kcmil		inches	inches	inches	inches	inches	lbs/kft	lbs
ACSR Conductors-15kV								
4	6/1	0.250	0.015	0.075	0.075	0.580	175	1767
2	6/1	0.316	0.015	0.075	0.075	0.646	227	2707
1/0	6/1	0.398	0.015	0.075	0.075	0.728	304	4161
2/0	6/1	0.447	0.015	0.075	0.075	0.777	357	5035
3/0	6/1	0.502	0.015	0.075	0.075	0.832	418	6289
4/0	6/1	0.563	0.015	0.075	0.075	0.893	495	7932
266.8	18/1	0.537	0.015	0.075	0.075	0.867	493	6536
266.8	26/7	0.642	0.015	0.075	0.075	0.972	601	10573
336.4	18/1	0.684	0.015	0.075	0.075	1.014	611	8246
336.4	26/7	0.720	0.015	0.075	0.075	1.050	718	13395
336.4	30/7	0.741	0.015	0.075	0.075	1.071	788	16971
397.5	18/1	0.743	0.015	0.075	0.075	1.073	694	9443
397.5	24/7	0.772	0.015	0.075	0.075	1.102	781	13775
397.5	26/7	0.783	0.015	0.075	0.075	1.113	819	15485
477	24/7	0.846	0.015	0.075	0.075	1.176	905	16340
477	26/7	0.858	0.015	0.075	0.075	1.188	950	18525
477	30/7	0.883	0.015	0.075	0.075	1.213	1048	22610
556.5	18/1	0.879	0.020	0.075	0.075	1.229	930	13015
556.5	24/7	0.914	0.020	0.075	0.075	1.264	1052	18810
556.5	26/7	0.927	0.020	0.075	0.075	1.277	1106	21375
636	18/1	0.940	0.020	0.075	0.075	1.290	1035	14915
636	26/7	0.990	0.020	0.075	0.075	1.340	1234	23940
ACSR Conductors-25kV								
2	6/1	0.316	0.015	0.125	0.125	0.846	355	2707
1/0	6/1	0.398	0.015	0.125	0.125	0.928	445	4161
2/0	6/1	0.447	0.015	0.125	0.125	0.977	506	5035
3/0	6/1	0.502	0.015	0.125	0.125	1.032	576	6289
4/0	6/1	0.563	0.015	0.125	0.125	1.093	663	7932
266.8	18/1	0.537	0.015	0.125	0.125	1.067	659	6536
336.4	18/1	0.684	0.015	0.125	0.125	1.214	800	8246
397.5	18/1	0.743	0.015	0.125	0.125	1.273	893	9443
477	18/1	0.814	0.015	0.125	0.125	1.344	1012	22610
556.5	18/1	0.879	0.020	0.125	0.125	1.429	1154	13015
636	18/1	0.940	0.020	0.125	0.125	1.490	1269	14915
795	36/1	1.040	0.020	0.125	0.125	1.590	1415	12510

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FR-NP™ Flame Resistant Non-Propagating Spacer Cable (Tree Wire) ACSR XLPE/FRXLPE (15kv-35kv rated)

Conductor Size	Number of Strands	Conductor Diameter	Conductor Shield Thickness	Inner Covering Thickness	Outer Covering Thickness	Finished Cable Diameter	Cable Weight	Rated Strength
AWG/kcmil		inches	inches	inches	inches	inches	lbs/kft	lbs
ACSR Conductors-35kV								
4/0	6/1	0.563	0.015	0.175	0.125	1.193	746	7932
266.8	18/1	0.537	0.015	0.175	0.125	1.167	741	6536
336.4	18/1	0.684	0.015	0.175	0.125	1.314	892	8246
397.5	18/1	0.743	0.015	0.175	0.125	1.373	988	9443
477	18/1	0.814	0.015	0.175	0.125	1.444	1111	22610

All values are nominal and subject to correction

Millions of Square Feet of Warehouse



Multi-Millions of Dollars in Inventory



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