Are Lightning Master Ultra-Sharp Point™ Air Terminals More Likely to Cause Fires than Conventional Franklin Lightning Rods?

The answer is emphatically no. In fact, the embarrassing anti-corollary to this assumption is that conventional Franklin lightning rods are actually more likely to cause fires.

This rumor was started by ULPA, a membership organization of conventional lightning rod installers with a photo published on the back page of their May 1994 ULPA newsletter (a copy may be available from ULPA, if requested). The photograph purported to be a "UL Listed dissipation air terminal being tested". This was no "test", only a destruction for theatrical and marketing purposes. It had been connected to a device that imparted a high amperage surge into the air terminal. This test had nothing to do with real world conditions, and had no comparison to a conventional lightning rod under the same conditions. It is telling that no comparable "testing" was done of conventional Franklin rods. This rumor is interesting in light of the fact that there has never been a reported case of fire attributed to the electrodes of a Lightning Master air terminal.

This accusation demonstrates a profound misunderstanding of thermodynamics in general and the concept of barely molten heat transfer in particular. To address this misinformation, Lightning Master commissioned an inquiry by a thermodynamics engineering firm.

The engineering report discussed several factors, including the theoretical problem, heat loss rate, time, acceleration due to gravity, heat loss versus surface area, cooling rate, convective cooling, and energy content of a just-barely molten ball, all affecting the heating of the surface upon which it falls. The conclusion reached was that the heat content of, and potential for fire damage from a conventional Franklin lightning rod vastly exceeds those of Lightning Master air terminal.

Heat applied over time is required to cause ignition. That is why you can pass your finger through the flame of a candle without being burned. However, if you lengthen the time the candle flame heat is applied to your finger, you will be burned. Another example is the "sparkler" candles sometimes used on birthday cakes. They throw off tiny bits of burning magnesium which land on the cake and tablecloth, but don't start fires because they are so small. Although their temperature is high, both their mass and areas of contact are very small. Same with the small radius dissipating elements on the streamer-delaying air terminal.

When a Lightning Master air terminal is struck by lightning, the damage to the small electrodes is proportional to the magnitude of the strike. In most cases, an area about the size of a quarter is burned down approximately ½". The surrounding electrodes remain undamaged. Since there are over 1,000 electrodes in a typical air terminal, the loss of a small number does not affect performance to the extent that the air terminal needs to be replaced. The diameter of the just barely molten mass will never exceed 0.008", the radius of the electrodes. This small mass cools rapidly and is unable to retain very much thermal energy.

When a conventional, Franklin lightning rod is struck, the damage to the tip of the lightning rod is also proportional to the magnitude of the strike. In most cases a small blob of lightning rod material is melted off, and falls. As the mass is larger than that of the small electrodes, it is more likely to cause ignition.

The diameter of the just barely molten mass will approach that of the original lightning rod point. In these photos, one can clearly see that the mass is more substantial than 0.008", so it retains more thermal energy.

Conclusion. Applying the just barely molten principle of thermodynamics, it is apparent that not only is a Lightning Master Ultra-Sharp Point™ air terminal unlikely to cause a fire, but that a Franklin lightning rod is actually more likely to cause a fire.