



**838 COATINGS**

12800 State Hwy 13, STE 400  
Savage, MN 55378

## Silicone Roof Coatings: A deeper Look

### Introduction:

Silicone coatings have been taking up more and more market share within the fluid applied segment of the roofing industry the past 10+ years. Many contractors swear by their high performance in ponding areas and low slope restoration. It is important to understand what makes a silicone a silicone. In order to do that, one needs to understand the raw chemistry that is occurring to formulate a silicone resin for roofing.

Alkoxy and Oxime curing mechanisms are the two common methods for curing silicone coatings. These mechanisms determine how the silicone coating transforms from a liquid or paste into a solid and durable film on the roof. Each curing mechanism has its own characteristics, advantages, and applications. Let's compare Alkoxy and Oxime curing mechanisms in Silicone Coatings:

### Alkoxy Curing Mechanism:

1. **Chemical Reaction:** Alkoxy curing, also known as condensation curing, occurs through a chemical reaction between alkoxy groups (typically methoxy or ethoxy) on the silicone polymer and moisture from the air. This reaction forms siloxane bonds (Si-O-Si) and releases alcohol as a by-product.
2. **By-Products:** The alkoxy curing process generates alcohol as a by-product, which may need to be managed or removed from the curing environment.
3. **Application:** Alkoxy-cured silicone coatings are often used in construction, electronics, and industrial applications. They are known for their adhesion to various substrates, including glass and metals.
4. **Performance Characteristics:** Alkoxy-cured silicone coatings offer excellent weather resistance, UV resistance, and durability. They are particularly suitable for applications requiring long-term exposure to outdoor conditions. Typically offer primer-less adhesion and higher tensile strength when compared to Oxime chemistry.
5. **Cure Time:** Alkoxy-cured coatings typically have a longer cure time compared to oxime-cured coatings, which may affect the speed of application and the overall project timeline.

### Oxime Curing Mechanism:

1. **Chemical Reaction:** Oxime curing involves the reaction between oxime groups (-N=C(R)-OH) present in the silicone polymer and moisture from the air. This reaction forms siloxane bonds and releases oxime compounds as by-products.



2. **By-Products:** Oxime curing generates oxime compounds as by-products. These compounds are typically less volatile than alcohol by-products from alkoxy curing, making oxime-cured coatings more user-friendly.
3. **Application:** Oxime-cured silicone coatings are used in various industries, including construction, automotive, and electronics. They are chosen for their adhesion, flexibility, and resistance to moisture and UV radiation.
4. **Performance Characteristics:** Oxime-cured silicone coatings are known for their flexibility, good adhesion to a wide range of substrates, and resistance to weathering, making them suitable for outdoor and indoor applications.
5. **Cure Time:** Oxime-cured coatings often have a faster cure time compared to alkoxy-cured coatings, which can be advantageous in projects where quick drying or turnaround times are essential.

#### Key Differences:

1. **Chemical Groups:** Alkoxy curing involves alkoxy groups (methoxy or ethoxy), while oxime curing relies on oxime groups ( $-N=C(R)-OH$ ) for the chemical reaction with moisture.
2. **By-Products:** Alkoxy curing releases alcohol by-products, whereas oxime curing generates volatile oxime compounds. The choice of curing mechanism can impact the odor and handling of the coating.
3. **Cure Time:** Alkoxy-cured coatings generally have longer cure times compared to oxime-cured coatings, affecting the speed of application and project schedules.
4. **Application:** Both curing mechanisms are used in various industries, with alkoxy-cured coatings often preferred for their outdoor durability and oxime-cured coatings chosen for their flexibility and adhesion.

#### Conclusion:

In general, the specific curing chemistry of silicone is not a huge factor for your overall roofing needs, however there are some specifics that could sway a contractor or building owner to one chemistry over the other. As previously stated, Alkoxy silicones tend to have a stronger smell but don't typically require primers, while Oxime silicones tend to cure slower and often need primers. Ultimately the choice between alkoxy and oxime curing mechanisms in silicone coatings depends on the specific requirements of the application, including adhesion, flexibility, cure time, and resistance to environmental factors like UV radiation and moisture. Property



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owners, manufacturers, and contractors should carefully consider these factors when selecting their roof coating option.