



Coating Chemistry - Strengths and Weaknesses

Acrylic Roof Coatings: Acrylic roof coatings have the longest history in the industry. They were first formulated for roofing in the mid 1970's. Acrylic roof coatings are water-based chemistries that are very UV stable with high tensile strength and elongation built into the resin structure. Acrylics are the easiest to use of all roof coatings due to the water clean-up and low reactivity. They tend to be the safest with regards to exposure.

Strengths:

1. High performance in all climate zones.
2. Most cost-effective roof coating solution.
3. Great in positive slope applications.
4. Maintain a High Solar Reflective index long term.
5. Very versatile when working with other chemistries in hybrid situations.

Weaknesses:

1. Acrylics can lose mils as they age. (roughly .5 mils per year.)
2. Cold temperatures are of concern with Acrylics because of their water-based chemistry. They need to be installed at temperatures 40°F or higher.
3. In higher humidity climates, Dew can be a concern as well. In order to prevent a "Wash Off", Acrylic coatings cannot be applied if Dew is imminent or if the Dew point and Temperature are within 5 degrees.
4. Acrylics swell under ponding water which means that they should be used with caution in areas of known ponding water.

Polyurethane Roof Coatings: Polyurethane roof coating systems are typically higher performing systems when compared to typical water-based systems. Polyurethanes fall into two main chemistries. Aliphatic and Aromatic. Aromatic chemistries tend to be used as basecoats in most coating systems because they are much less UV Stable than Aliphatic chemistries. Typically, these Aromatic Urethanes have high Tensile Strength, but lower Elongation when compared to an Aliphatic. Most manufacturers utilize Aliphatic Urethanes as Topcoats in their system because they have very good UV Stability, better water swelling resistance, and a very high combination of tensile strength and elongation.

Strengths:

1. High Tensile Strength paired with High Elongation.
2. Good water swelling resistance.
3. Very good foot traffic & impact resistance.
4. Can be applied in colder more variable weather conditions.
5. Typically, they are solvent based or 100% solids chemistries.

Weaknesses:

1. Urethane Coating formulas contain many known carcinogens such as aliphatic hydrocarbon solvents, Isocyanate, and others.
2. Many Urethanes have a strong odor which needs to be addressed with building inhabitants.
3. Urethanes are very reactive, if they are applied too thick or in the wrong weather conditions, they can “pinhole” causing little holes to occur within the film of the coating. Urethanes can also trap air as they cure and “off gas”. In some cases, they can cure too fast which will trap that air and cause bubbling within the film. These pinholes or bubbles weaken the film strength and compromise the overall integrity of the coating system.

Silicone Roof Coatings: Silicones are moisture-cure chemistries that can be both solvent-based as well as High Solids (HS) 100% solids. In the case of the 100% solids Silicones, the resin is used as the flow agent. All Silicone roof coating formulas fall into two categories: Alkoxy cure mechanism and Oxime cure mechanism. These cure mechanisms are more important for the manufacturing process but there are some slight differences that can be noticed by the applicator. In general: Alkoxy cure silicone products don't need to be mixed on-site before application, and they tend to cure faster than Oxime cure mechanisms.

Strengths:

1. Silicones contain very strong OH bonds within their resin structure which is a very light stable molecule. This makes them very resistant to UV Degradation from the sun.
2. Silicones are inorganic which prevents any type of fungal or mold growth onto the film of the coating long term.
3. Silicones don't get hard and brittle long term.
4. Strong resistance to ponding water which makes them ideal for low slope roofs.
5. Adhesion is good to a myriad of substrates which can reduce primer use.
6. HS Silicones' wet mil thickness is equal to dry mils. This means you lose 0 product to evaporation or shrinkage.
7. Low & Zero percent solvent formulas meet all VOC regulations in US and Canada.

Weaknesses:

1. Low Tensile Strength and Elongation compared to other roof coatings.
2. Very poor tear strength. Not recommended on metal roofs due to this.
3. Silicone roof coating surfaces generally pick up much more dirt than other coatings. This causes a significant drop in reflectivity over time when compared to other roof coating chemistries.
4. Silicone only sticks to silicone. Once Silicone is installed, you need to use Silicone based products to repair and recoat it.



5. Silicone products require high pressures and volume outputs to spray and they're more difficult to work with than other chemistries.

SEBS & SBS Roof Coatings: SEBS (Styrene-Ethylene-Butadiene-Styrene) and SBS (Styrene-butadiene-styrene) roof coatings fall into the category of "Rubber" Coatings. These coatings are manufactured by utilizing a block rubber polymer that is then dissolved in some kind of hydrocarbon solvent. All performance additives are added to finish the formulation. These types of coatings cure by solvent evaporation. Rubber coatings offer a multitude of benefits when compared to other coating chemistries such as: nearly 0% moisture swell rate, very low vapor permeance, as well as strong tensile strength and elongation.

Strengths:

1. Most rubber coatings perform well under ponding water because they have a very low moisture swell rate. In some cases, it's as low as 0%.
2. Very low vapor permeance rate.
3. Strong Tensile strength.
4. High % Elongation.
5. Very good launderability. (Stays whiter longer than many coating chemistries)
6. Strong Chemical resistance.

Weaknesses:

1. High Solvent formulas typically don't meet regional VOC requirements.
2. Two coat system.
3. Spray Machine set up needs to be stronger than typical Acrylic Coatings.
4. Solvent cleanup instead of water which means more safety protocols.
5. Applicators need protection from exposure to some raw materials in the formula.

PMMA Coatings PMMA (Polymethyl-methacrylate) is a type of acrylic plastic that some manufacturers are utilizing in formulations for high end fluid applied roofing applications. PMMA products are very strong, and they cure very fast which can afford applicators larger working windows in a myriad of climate conditions. PMMA products are typically 2-component (2K) systems that need to be premixed (catalyzed) or sprayed through a proportioned spray system set up.



COATINGS

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Strengths:

1. Nearly instant cure. 10-15 seconds after catalyzed or sprayed through proportioned spray rig.
2. 100% solid systems which meet all regional VOC requirements.
3. Extremely good water, chemical, and foot traffic resistance.
4. High Tensile Strength

Weaknesses:

1. 2K set up can cause difficulties. Applicators need proper training with equipment and products before installation.
2. The smell of the two component resins can sometimes be strong. Proper nose protection is required.
3. Some components of the product are highly flammable and need to be treated with proper safety.
4. Very low elongation, which could bode a problem on a roof that moves a lot.
5. Material cost is very high relative to other products systems.