Silicone Roof Coating

Restoration vs Replacement

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• Any concerns or questions regarding the meaning or applicability of this policy, as well as any concerns regarding activities or discussions at SPFA meetings should be promptly brought to the attention of SPFA’s Executive Director and/or its legal counsel.
• I. Introductions
• II. Market Opportunity
• III. What is Silicone?
• IV. Restoration vs Re-roof
• V. Equipment
• VI. Features, Advantages, Benefits & Negatives
• VII. T.U.R.D.
• VIII. Q & A
Q: Do you get every job you bid?
A: Probably not

Q: Why not?
A: Price, budgets, perception, competition, project duration, weather, landfills, etc…

Q: Need another tool in your tool box?
A: Maybe, tell me more
Market for roofing membranes

US commercial roofing = 8bb ft²

- TPO: 30%
- EPDM: 17%
- PVC & Other: 11%
- BUR & Mod Bit: 26%
- Metal: 10%
- Foam: 3%
- Other: 3%
What is Silicone?

• Definition

• Chemistry

• Brief History

• Uses of Silicone Coatings
Definition

Dictionary Definition

- **sil·i·cone**
- ˈsiləˌkōn/
- noun
- noun: **silicone**; plural noun: **silicones**

“any of a class of synthetic materials that are polymers with a chemical structure based on chains of alternate silicon and oxygen atoms, with organic groups attached to the silicon atoms. Such compounds are typically resistant to chemical attack and insensitive to temperature changes and are used to make rubber, plastics, polishes, and lubricants.”

Per SPFA AY 102 Coatings for SPF:

“**General Description:** Silicone coatings are silicone polymer elastomeric coatings. They are available in single or plural component materials. They are characterized by their exceptional weatherability, their ability to withstand temperature extremes and retain physical properties. Silicone coatings have a high moisture vapor permeability and are classified as breathable coatings.”
Silicone Coating Types

Chemistries
- Acetoxy
- Alkoxy
- Oxime

“Low” Solids
- Typically 65% - 85% solids by volume
- Higher VOC
- Solvent carrier
- 2 coat system over SPF
- Often granulated

“High” Solids
- Typically > 85% solids by volume
- Low VOC
- Solvent - free
- 1 or 2 coat system
- Compatible over most membranes
Silicones undergo chemical cure.

Silicone
Cures (chemical reaction) as it is exposed to moisture
- Top to Bottom Cure
- Cure Rate Depends on
  - moisture (%RH)
  - temperature
  - chemistry
- Sealant Physical Properties change very little
- Inorganic – strength of chemical backbone determines how coating reacts to water, sun, heat, time & movement.
- Lasting Durability
- Solvent Clean Up

**Chemical Curing Process**

**Moisture (atmospheric)**

**By-product (alcohol)**
## Physical Properties

### Typical 1-Part Silicone Property Ranges

<table>
<thead>
<tr>
<th>Property</th>
<th>Value Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Translucent to Opaque Colored</td>
</tr>
<tr>
<td>Cure Speed</td>
<td>5 minutes – 8 hours</td>
</tr>
<tr>
<td>Rheology</td>
<td>Flowable Coatings to Thixotropic</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>100 – 600 psi</td>
</tr>
<tr>
<td>Elongation</td>
<td>100 – 1000 %</td>
</tr>
<tr>
<td>Shore A Hardness</td>
<td>10 – 60</td>
</tr>
<tr>
<td>Adhesion</td>
<td>Primerless to Primer Required</td>
</tr>
</tbody>
</table>
Brief History

1938
The “Silicone Project” starts within the Research Laboratory at the General Electric Company in Schenectady, New York.

1940
Dr. E.G. Rochow discovers and patents the “direct process” for making methylchlorosilanes, a key building block of all silicone products.

1942
Industry responds to a call from the war effort and creates silicone products to meet a need within U.S. Military operations (alternative to natural rubber)

1944
First commercial production of silicones.

1947
First silicone production plant opened in Waterford, New York. The plant still operates today.

1950’s
Silicone used in weather topping, UV coatings, RTV sealant, Mercury capsule sealant and variety of other applications

1960’s
First used in roofing applications in the 1960’s over sprayed polyurethane foam. Two component catalyzed systems phased out. Evolved to single component, moisture cured products.

1990’s
Products developed to lower VOCs and vary % solids by volume

2000’s
Development of high solids, moisture cured, single component silicone. Lower VOC, higher % solids, high build with ability to coat other substrates in single coat due to solvent free formulations
We entered the consumer market in a big way with this display in GE Progressland at the 1965 World’s Fair in N.Y. The Progressland building also had the first silicone roof.
Some Uses of Silicone Coatings
WHY Re-roof? IF You Can Restore?
• Same warranty as a new roof!
• Lasts longer than many membranes
• Lower cost option. Often half the cost of a tear-off & new roof
• Code requirements (two roofs)
• Less time, less interruption, less landfill
• Energy Savings – Cool Roofing
• For structurally sound and suitable roofs
• **not all roofs can or should be restored**
Substrates

- SPF
- Asphaltic
- Single-ply
- Metal
- Concrete
- Other
Photo courtesy of Premium Spray Systems
Photo courtesy of Progressive Materials
Photo courtesy of Progressive Materials
Photo courtesy of Freedom Coatings
Photo courtesy of Progressive Materials
Photo courtesy of Progressive Materials
Equipment
Benefits of Silicone

Ease of Application
extended season in colder climates
more working days in rainy climates
Some formulations are Primerless
One coat applications

Moisture Cured RTV - Room Temperature Vulcanizing
cures in 1-3 hours vs. 6 - 20 hours for most water based coatings to dry

Not water based so no fear of wash-off before drying or an afternoon shower or dew or freeze

Vapor permeable/breathable

Resistance to Ponding Water

Will not freeze
Some materials can be sprayed as low as 0 degrees F

Stable viscosity even below freezing

One or two coat system
(typically 15 dft to 36 mil dft)
less labor and less duration of project.
quicker cure times
quicker recoat times between coats
Long-Term Weathering Study

Samples placed on racks in 1983

Atlas South Florida Test Service
UV Resistance & Weatherability

- Silicone
- Polyurethane
- Polysulphide
- Acrylic

4000 hours in QUV chamber ~ 5-1/2 months
Negatives of Silicone Coatings

Clean-up with mineral spirits or proprietary solvents not water

Longer cure time in lower humidity
- typical cure in 2-3 hours at 75F and 50% RH

Inorganic
- greater dirt pick-up, not “self-cleaning” like organic coatings
- technology to decrease dirt pick up exists
- very slippery if wet. (Can be granulated)
- lower tensile strength and “softer” than other materials
- Potential asphalt bleed through w/o proper primer or base coat

Higher cost per gallon vs other coatings

Higher viscosity vs most water based coatings

Longer lasting
- fewer recoats

Should only recoat silicone with silicone
- granulated silicone can possibly be recoated with acrylic or urethane
T.U.R.D.*

- Terminal
- Unreparable
- Roof
- Deficiencies

*phrase courtesy of Dan Varvais - 2001
Avoid T.U.R.Ds

• **Three “A’s”**
  ✓ Adhesion
  ✓ Adhesion
  ✓ Adhesion…

• Proper prep is critical

• Use good roofing practice and common sense

• Attention to details

• Penetrations, seams, edges, fasteners

• This is Roof RESTORATION not a brand new roof system

• Not all roofs are suitable for restoration coatings
Field Adhesion Testing

Measure peel adhesion with pli (pounds per linear inch) based on the width of fabric. For example, if the fabric is 2”, divide your fish scale reading by 2”.

A pli greater than 2.0 is generally considered a passing rating.
Photos courtesy of Covestro, LLC
Remember...

Yep...
Still a pig.

You can polish a turd and dip it in gold but I hate to disappoint, you still a turd.

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Questions???
THANK YOU!