

BY DUSTIN BROOKS



# SELECTING THE RIGHT LIQUID PRODUCT

Coatings used to extend the lifespan of roofs got a bad rap due to widespread failures in the 1990s. The technology has improved dramatically since — it's just a matter of matching the material type to the application

**L**iquids are flooding the roofing industry these days. It's rare to find a manufacturer or contactor that isn't promoting a "roof coating" or "liquid membrane."

There's a difference between a coating and a membrane, and it can be hard to draw the line at times. It can be helpful to consider the human anatomy.

Skin is a membrane. It's tough, flexible, and virtually impermeable and it protects the underlying tissues and organs from the outside. However, skin can be damaged if it's exposed to the sun too long.

Sunscreen is a coating. Its purpose is to protect skin — the membrane — from damage. It's permeable, so it's still possible to sweat, and it's applied relatively thin. It doesn't last very long, so it needs to be re-applied.

Liquid roofing products are not all that dissimilar.

There are those that work great as a coating (sunscreen): they are applied in thin layers of 20 to 30 mils (one mil equals one-thousandth of an inch), defend against UV degradation, are permeable, cool things down (thanks to their reflectiveness), but need to be re-coated and touched up often. They do not perform like a long-lasting membrane, but they are great at protecting membranes.

Then there are other liquid products that work great as a membrane: they are thick (50 to 80 mils), durable, flexible, strong, and impermeable. They serve as a primary barrier separating the structure from the elements. Some are reinforced, some are multi-layered, but the intended purpose is the same. They have no seams, adhere fully, and self-terminate. These liquid-applied, seamless membranes should act more like skin than sunscreen.

Installing a seamless membrane directly over an old roof helps maximize the original investment. However, it's important to note that restorations or recovers are not recommended on roofs that are past a certain point of deterioration or have saturated insulation.

Liquid roofing products are best used for repairs and/or the restoration of existing roof membranes to avoid costly, disruptive, and wasteful roof tear-offs. While they can be used in a full replacement or new construction, the focus of this article will be on their restoration capabilities.

Too often, liquid products are given the same negative stereotype. In Canada, extensive roof coating failures in the 1990s made building owners leery of anything sold in a bucket or drum. Liquid roof technologies have improved drastically since then, but each serves a very different purpose. Some liquids are better used as a coating, and others as a membrane.

Here's an overview of the applications of some of the most common liquid roof products:

### ACRYLIC

#### Average Values

Elongation - **381%**

Concrete Adhesion - **360 psf**

Permeance (water vapor transmission) - **6.8 perms**

VOC content - **32 g/L**

Tensile Strength - **253 psi**

Thickness - **20 mils**

Acrylic is best used as a "sunscreen" for UV protection of membranes to extend their life. It's great for reflectivity to reduce surface temperature and energy costs (depending on insulation in the existing roof). Other pros include that they're low-cost, come in a variety of colour options, have a good sacrificial/wear layer and are easy to recoat. The cons of acrylic liquid roofing products are that they won't withstand ponding water, have low strength and have been inappropriately promoted as a membrane.

### SILICONE

#### Average Values

Elongation - **193%**

Concrete Adhesion - **90 psf**

Permeance (water vapor transmission) - **5.8 perms**

VOC content - **47 g/L**

Tensile Strength - **322 psi**

Thickness - **20 to 30 mils**

Silicone is best used as a top coat over a membrane to prevent premature degradation, extend life, and add reflectivity. Other pros include that it's reflective, withstands ponding water, resists animal fats, has good tensile strength and experiences minimal degradation. However, it's very

difficult to repair or recoat, as nothing but silicone will adhere to silicone. Other cons include that it's not water-based, picks up dirt (turns yellow/brown quickly), has poor tear resistance and is slippery when wet.

| <b>POLYURETHANE FOAM</b>            |
|-------------------------------------|
| Average Values                      |
| Elongation - 0%                     |
| Concrete Adhesion - 90 psf          |
| Permeance - 1.5 perms (closed-cell) |
| VOC content - 0 g/L                 |
| Tensile Strength - 70 psi           |
| Thickness - 1-4 inches              |

Polyurethane foam is best used as insulation material, not as a waterproofing membrane. Its top coat is typically acrylic or silicone and requires constant maintenance to protect the foam from UV exposure. The pros of polyurethane foam are that it provides excellent insulation (it has a high R-value), can be applied to any thickness and is watertight. The cons of polyurethane foam is that it's not UV stable, requires a top coat to protect it from becoming open-cell, is easily punctured and damaged by foot traffic, birds, and insects, is difficult to install, has no elongation and low strength.

| <b>URETHANE</b>                                  |
|--|
| Average Values                                   |
| Elongation - 376%                                |
| Concrete Adhesion - 292 psf                      |
| Permeance (water vapor transmission) - 0.7 perms |
| VOC content - 41 g/L                             |
| Tensile Strength - 1,100 psi                     |
| Thickness - 45 mils                              |

Urethane is best used as a membrane for parking decks, flooring, plaza decks, and other industrial applications. It's suitable for use on certain types of existing roofs, but is difficult to repair or recoat. The pros of urethane are that it's strong and durable, impermeable and has high tensile strength. The cons of urethane are that its installation is sensitive, causes toxic fumes, is flammable in liquid form, can be expensive and has low elongation.

## DECRYPTING THE TECHNICAL JARGON

**Elongation:** the amount of "stretch" a material has before it tears. Considering liquids are fully adhered to the surface, high elongation is important to withstand structural movements or expansion/contraction of underlying materials. Typically, higher elongation equals better puncture, impact, and hail resistance.

**Tensile strength:** the amount of force required to tear a material after it stretches, commonly measured in pounds per square inch (psi). Low tensile strength means the product is more susceptible to damage. It's important to have a good combination of elongation and tensile strength.

**Permeance:** how much water vapor (moisture) can travel through the coating or membrane. Essentially it indicates how "breathable" a product is. Higher permeance means the product will not withstand ponding/standing water. It may be water-resistant, but is not truly waterproof. Low permeance (under 1 perm), means it is impermeable and can hold water on top of it forever without moisture transfer.

**Volatile Organic Compounds:** VOCs represent solvents in a liquid material that are harmful to human health and the environment. Many countries have VOC limits for paints and coatings to limit off-gassing.

**Adhesion:** how well a product sticks to a particular surface. The examples below use a concrete substrate and a value in pounds per square foot (psf). This is how much force or pressure is required to remove the product from the surface. It is often used to calculate wind uplift strength.

| <b>COLD-PROCESS ASPHALT EMULSION</b>           |
|--|
| Acceptable Values                              |
| Elongation - 70%                               |
| Concrete Adhesion - 120 psf                    |
| Permeance (water vapor transmission) - 2 perms |
| VOC content - 8 g/L                            |
| Tensile Strength - 322 psi                     |
| Thickness - 60 mils (with reinforcement)       |

Cold-process asphalt emulsion is best used for roof restoration (with top coat), but only in warm climate zones and over roofs in fair condition. The pros of cold-process asphalt emulsion are that it's low-cost, easy to apply, withstands ponding and has a proven track record. The cons of cold-process asphalt emulsion are that it cracks in freezing temperatures, requires a top coat, has poor strength and elongation and requires fabric reinforcement.

## ROOFING FEATURE

|   |
|---|
| <b>LIQUID RUBBER</b>                                    |
| Acceptable Values                                       |
| Elongation - <b>1500%</b>                               |
| Concrete Adhesion - <b>990 psf</b>                      |
| Permeance (water vapor transmission) - <b>0.2 perms</b> |
| VOC content - <b>0 g/L</b>                              |
| Tensile Strength - <b>750 psi</b>                       |
| Thickness - <b>60-80 mils</b>                           |

Liquid rubber is best used as a roof restoration membrane with a reflective top coat. The pros of liquid rubber are that it has high elongation, good tensile strength, can be applied in any thickness in one coat, is impermeable, has excellent adhesion and can be installed to membrane thickness. The cons of liquid rubber are that it only comes in one colour (black), typically requires top coat, is more expensive and cannot be installed in freezing temperatures.

Acrylic is best used as a “sunscreen” for UV protection of membranes to extend their life.

With many liquid technologies available to protect roof assets, it’s important to choose the right product for the application. A new membrane may be needed and a thin coating would only cause further problems. Or a new membrane may not be needed, only a coating to extend the roof’s life. Never hesitate to ask contractors, consultants, or suppliers for physical material samples, independent lab test reports, data sheets, contractor certifications, case studies, and references. Proper due diligence is vital when investing further in existing roof assets. | **CFM&D**

Dustin Brooks is the director of sales at Triton Incorporated in Cedar Rapids, Iowa. His group provides a variety of roofing products and services for building owners/operators throughout the world. Their focus is on protecting existing roof assets through proactive maintenance and restoration. He enjoys speaking engagements, volunteering for non-profits, and visiting his family in Alberta. Dustin can be reached at [dustinbrooks@tritonwp.com](mailto:dustinbrooks@tritonwp.com) or 319-861-5233.

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