Liquids Come in Two Forms: Liquid-applied Roof Membranes & Roof Coatings

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Introduction

Liquid-applied roof membranes (LAR) and roof coatings (aka, maintenance coatings) are not only here to stay, their use continues to increase. This article provides background on the use of liquids in the roofing and construction industries, provides reasons for an ever-growing liquids market, assesses how the building code (i.e., IBC) differentiatesd between liquid-applied roof membranes and roof coatings, and–through RoofNav–validates LARs as the primary roof covering.

This article also provides insights into why there is confusion between roof coatings and liquid-applied roof membranes. Their intended use is different, yet many of the materials are the same for both applications. There can be confusion because the types of materials used for coatings are quite often also being used as liquid-applied roof membranes, but that is changing. How do we categorize and define these different installations that have different intended uses when both applications often use essentially the same set of materials? This article takes a close look at each of these product categories—liquid-applied roof membranes and roof coatings—to find their similarities and differences. And hopefully to provide clarity around the use of terms and definitions of use. Here's what you need to know to help understand and differentiate between the two.

“the most dramatic advance in coating properties has come in the past 40 years...”

Background

Liquid-applied materials have been used in the construction and roofing industries for a very long time. They have been made from many different materials--from beeswax and pitch some 5000 years ago, to lacquers and varnishes just a couple thousand years ago, to our current polymer-based materials. The more viscous materials were used to keep water out of structures, or to keep water storage and transport more leak-free. The less viscous materials are commonly used to coat or seal materials, but not necessarily used to keep liquid water out (or in, for that matter).

According to the Roof Coating Manufacturers Association, “the most dramatic advance in coating properties has come in the past 40 years, with the development of polymers[1].” Polymer-based coatings are used on existing roofs, plaza decks, parking garages, balconies, and playgrounds, and to most commonly provide reflectivity, UV protection, and an aesthetically pleasing surface. Inherently, because of the materials, coatings do provide a level of water resistance, but that is not their intended purpose.

Polymer-based liquid-applied membranes are primarily used as the waterproofing (i.e., weatherproofing) layer for new roofs, replacement roofs, roof re-cover systems, parking garages, plaza decks, balconies, and even interior spaces like mechanical rooms.

The common polymer-based materials include acrylics, PMMA, silicones, STP, and urethanes. Depending on the design intent and system configuration (e.g., reinforced) of polymer-based materials, they can be used to extend the life of an existing roof when used as a roof coating, or to provide a warranted or guaranteed roof or waterproofing membrane when used as a liquid-applied roof membrane.

Reasons for Increased Market Share

There are a number of key reasons that help explain the increased use of liquids as roof membranes and coatings.

- These materials can be light colored so they are reflective which helps improve the energy efficiency of a building and reduce the urban heat island effect.
- Using liquid-applied membranes reduce waste created by a tear off.
- The use of materials that can be applied at ambient temperature is welcomed by an installer. There are no hot-applied materials or open flames which reduces certain safety issues.
- Materials are typically provided in containers sized for easy transport to and from rooftops.
- Common low-cost installation tools are used—brooms, brushes, squeegees; and simple, low-cost spray equipment.

Defining the Terms

One way to help sort out the difference between roof coatings and liquid-applied roof membranes is to understand current definitions used in the industry. The International Building Code (IBC) is a good place to start since it is a consensus-based document that provides the requirements for roofing and waterproofing.

International Building Code

The International Building Code does include a definition for coating, but does not include a definition for liquid-applied membrane.

"ROOF COATING". A fluid-applied, adhered coating used for roof maintenance or roof repair, or as a component of a roof covering system or roof assembly." (Note: words and terms in an IBC definition that are also defined by IBC are written in italics.)

IBC's definition of Roof Coating tells us four things:

- Roof coatings are fluid-applied
- Roof coatings are adhered
- Roof coatings are used for maintenance or repair
- Roof coatings can be a component of a 'roof covering system' or 'roof assembly' (which are the same according to ICC's definitions)

"Roof Repair" is defined as "Reconstruction or renewal of any part of an existing roof for the purposes of correcting damage or restoring pre-damage condition."

"Roof Covering System" is a "Roof Assembly" per IBC.

"Roof Covering" is defined as "The covering applied to the roof deck for weather resistance, fire classification or appearance."

"Roof Assembly" is defined as "A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly can include an underlayment, a thermal barrier, insulation or a vapor retarder."

As you can see, the information found in the Building Code is paramount to the confusion between Roof Coating and Liquid-applied Roof Membrane. Simply put, IBC's definition of Roof Coating doesn't really help differentiate between roof coatings and liquid-applied roof membranes. IBC does state that coatings are intended for maintenance and repair, but stops there. And per IBC's definition, coatings can be used for Roof Repairs to "correct damage or restore pre-damage condition," but that is not how coatings are generally intended to be used, so, again, more confusion.

Even though the definitions are not clarifying, the arrangement of Chapter 15 of IBC gives insight into IBC's perspective on roof coatings and liquid-applied roof membranes. Let's break this down. Section 1507, Requirements for Roof Coverings, has and continues to include all low-slope and steep-slope materials used as roof coverings that are recognized by the code. This includes materials such as asphalt, wood, and slate shingles, as well as modified bitumen and single-ply roofing (and myriad others). The IBC has always included a section specifically for Liquid-applied Roofing within Section 1507, but there has never been a section anywhere

in Chapter 15 for Coatings (until the 2021 IBC—more on that in a bit). To that end, the IBC is essentially saying Liquid-applied Membranes are categorized similarly to all other membranes that are used as roof coverings and their intended use is for "weather resistance, fire classification or appearance" (from IBC's definition of "roof covering" as shown above). Because liquid-applied roof membranes are considered to be roof coverings by the IBC, roof systems that use a liquid-applied roof membrane need to be tested for fire, wind, and impact just like any traditional membrane roof system. Logically, it can be concluded that liquid-applied roof membranes are the primary roofing membrane, not a maintenance or repair item.

The liquid-applied membrane subsection within Section 1507 includes ASTM standards for materials not only used as liquid-applied membranes, but it includes the polymer-based materials (e.g., acrylics, polyurethanes, silicones) that are also intended to be used as coatings. This has often led to confusion within the code requirements, specifically how code officials would enforce the application of a coating product on an existing roof--as a new roof or as a maintenance item.

To help with clarification and code enforcement for coating application, new language was added to the 2018 IBC in the Reroofing Section that stated a roof coating can be applied to (essentially) any existing roof without triggering reroofing requirements. Prior versions simply stated that coatings could be applied over an existing Spray Polyurethane Foam without removing any existing roofs. The improved language in the 2018 IBC is as follows:

"Section 1511.3, Roof Replacement. Exception 4: The application of a new protective roof coating over an existing protective roof coating, metal roof panel, built-up roof, spray polyurethane foam roofing system, metal roof shingles, mineral-surfaced roll roofing, modified bitumen roofing or thermoset and thermoplastic single-ply roofing shall be permitted without tear off of existing roof coverings."

The additional language in the 2018 IBC was a very important step in distinguishing between coatings and liquid-applied membranes.

As an important step in clarifying the differences between roof coatings and liquid-applied roof membranes, the IBC was revised in 2021. Specifically, a new section was added--Section 1509, Roof Coatings. This was an entirely new section, and importantly, Roof Coatings are not a subsection within Section 1507, Roof Coverings. This strengthens the differentiation from a code perspective that coatings are not considered to be a new roof covering.
However, the 2021 IBC remains without a definition for liquid-applied roof or liquid-applied membrane. The code ultimately relies on manufacturers' intentions for their products as the differentiating factor between roof coatings and liquid-applied roof membranes.

ASTM

Unfortunately and somewhat surprizingly, ASTM D1079, "Standard Terminology Relating to Roofing and Waterproofing" does not define roof coating or liquid-applied roof membrane.

FM Approvals

Liquid-applied roof membranes are considered to be roof coverings by the IBC, and therefore they must be tested as a roof system and have approval listings. Approval listings are used to show that these systems have been tested and comply with the code requirements for roof system properties like fire-, wind-, and impact-resistance.

RoofNav—New Construction

Performing a search using the Assembly Search function within FM's RoofNav software results in a number of Approval Listings for "Liquid Applied Systems" used for new roofs. With no specific manufacturer selected, a RoofNav search results in over 8,100 Approval Listings for "Liquid-Applied System" used as new roofs.

Performing a second search using **Siplast** as the manufacturer results in 331 Approval Listings for "Liquid Applied Systems" used as "new roofs". There are 280 Parapro Approval Listings, 36 Paraflex Approval Listings, and 15 Terapro Approval Listings (as of June 27, 2023). When a liquid-applied membrane is used as a roof covering or waterproofing membrane, a reinforcement, such as Pro Fleece or Pro Grid Reinforcement is used between the top and base coats. There are myriad substrates and combinations of applications that are included as "new roofs" in RoofNav for our PMMA (Parapro and Terapro) and STP (Paraflex) product lines.

An example RoofNav listing is shown here for a Parapro Approval Listing. The assembly includes a top coat, a fleece reinforcement, and a base coat. Those components are installed over a torch-grade SBS sheet over a gypsum-fiber roof board. The assembly includes polyiso insulation mechanically attached to a steel deck.

Assembly Details

1. Top Coat		
Siplast Inc	Parapro Resin	View
2. Ply		
Siplast Inc	Pro Fleece	View
3. Base Coat		
Siplast Inc	Parapro Resin	View
4. Base Ply		
Siplast Inc	Pro Base LP TG	View
Siplast Inc	Pro Base TG	View
5. Securement from 4. Base Ply to 7. Cover Board		
Generic	torched	View
6. Substrate Primer		permeable Comments
Generic	concrete primer, asphaltic	View
Siplast Inc	PA-917 Primer	View
7. Cover Board		
United States Gypsum Company	SECUROCK Gypsum-Fiber Roof Board	View
8. Securement (Board Stock) from 7. Cover Board to 10. (Deck) Steel		
Siplast Inc	Parafast PA (Pre-Assembled)	View
SSSP15933		View
Siplast Inc	Parafast 3 in. Metal Plate	
Siplast Inc	Parafast Roofing Fastener	
9. Insulation (Board Stock)		
GAF	EnergyGuard POLYISO INSULATION	View
GAF	EnergyGuard TAPERED POLYISO INSULATION	View
Siplast Inc	Paratherm G	View
Siplast Inc	Paratherm G Taper	View
10. (Deck) Steel		
See Separate Steel Deck Manufacturer Listing	steel deck, 22 to 18 ga., wide rib (>90 psf)	View
Securement (Deck Lap)		
ITW Commercial Construction North American	#12 HWH Teks 1	View
ITW Commercial Construction North American	#12 HWH Teks 3	View
11. Securement (Deck) from 10. (Deck) Steel to 12. Structure		Comments
SSSP15442		View
Generic	3/4 in. washer	
ITW Commercial Construction North American	#12 HWH Teks 5	
12. Structure		View

It's important to recognize that an FM Approval Listing also provides information about the internal fire rating, exterior fire rating, and hail ratings. Many liquid-applied roof systems achieve Class A Exterior Fire ratings as well as Moderate or Severe Hail ratings.

Siplast's Assembly #450243-450204-0 (shown above) can be installed up to a 2:12 slope, and has a Class 1 internal fire-resistance rating, a Class A external fire-resistance rating, a Severe Hail rating, as well as a wind uplift rating of 165 psf.

RoofNav—Re-cover

In addition to their use as new roofing, one of the primary attributes of liquid-applied roof membranes is their use over an existing roof. Searching RoofNav using Siplast and "Re-Cover" results in 55 Approval Listings. Importantly, all 55 listings include a reinforcement layer between the top coat and the base coat.

Conclusion

Simply put, roof coatings are used to provide protection from the elements and help extend service life. Roof coatings are not installed as membranes so they are not intended to seal leaks or be considered "waterproof". To that end, manufacturers of roof coatings do not obtain approval listings for their coating products.

Liquid-applied roof membranes are considered to be just that—membranes—and are used as the roof covering in new and re-cover roof systems. Liquid-applied roof membranes are tested as systems and have approval listings just like traditional asphaltic, modified bitumen, and single-ply roof systems.

More About the Author

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Jim Kirby, AIA, is an architect for Siplast. His focus is Building Science, Industry Relations, and Compliance. He has a Masters of Architecture—Structures Option and is a licensed architect. His 30+ years in the roofing industry have covered low-slope, steep-slope, metal, and SPF roofing, as well as green roofs and rooftop solar. Jim writes and speaks about building science topics related to roofing, represents Siplast across numerous segments of the roofing industry, and helps manage Siplast's compliance documents and information. He is a board member for CRRC and SPRI, an active committee member for ARMA and ASTM, and a member of AIA, ICC, IIBEC, NRCA, and WSRCA.

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