Conklin Company Inc.
TECHNICAL BULLETIN
B-10-18-70
Commercial Roofing System Identification

Identifying Commercial Roofing Systems

The key to a successful retrofit roof system starts with identifying the existing products being used on the roof to be retrofitted. The roofing industry has changed in many ways over the last 40 years, yet there are many products and systems from 40 years ago still being used today. This technical bulletin can be used as a guide when trying to identify some of these products.
NOTE:

1) *Even the most experienced roofing contractor or inspector cannot properly identify a roofing system without doing several core samples to see how the system was assembled.*
2) *Conklin Company Inc. requires a seam treatment on all seams regardless of the type of system.*

Asphalt Built Up Roofing (multiply system)

Asphalt and Coal Tar Pitch have been part of low slope roofing solutions for more than seven decades and is specified by architects still today. Many different components make up this type of BUR roofing, so depending on how old the system is, the components may vary drastically.

Asphalt

Asphalt is an aliphatic compound and in almost all cases a byproduct of the oil industry. Some asphalt is manufactured from oil as the intended purpose, and this is limited to high-quality asphalt produced for longer lasting asphalt built-up roofs (BUR). Asphalt ages through photo-oxidation accelerated by heat. As it ages, the asphalts melt point rises and there is a loss of plasticizers. As mass is lost, the asphalt shrinks and forms a surface similar to alligator skin. Asphalt breaks down slowly in water and the more exposure the more rapid the degradation. Asphalt also dissolves readily when exposed to oils and some solvents.

There are four types of roofing asphalt. Each type is created by heating and blowing with oxygen. The longer the process, the higher the melt-point of the asphalt. Therefore, Type I asphalt has characteristics closest to coal tar and can only be used on dead level surfaces. Type II, is considered flat and can be applied to surfaces up to 1/4 in 12 slopes. Type III, is considered to be "steep" asphalt but is limited to slopes up to 2 in 12, and Type IV is "special steep". The drawback is, the longer it is processed, the shorter the life. Dead level roofs where Type I asphalt was used as the flood and gravel adhesive has performed nearly as well as coal tar. Asphalt roofs are also sustainable by restoring the life cycle by making repairs and recoating with compatible products. The process

can be repeated as necessary at a significant cost savings with very little impact on the environment. (See figure #1)

Asphalt BUR is made up of multiple layers of reinforcing plies and asphalt forming a redundancy of waterproofing layers. The reflectivity of built up roofs depends on the surfacing material used. Gravel is the most common and they are referred to as asphalt and gravel roofs. Asphalt degradation is a growing concern. UV-rays oxidize the surface of the asphalt and produce a chalk-like residue. As plasticizers leach out of the asphalt, asphalt built-up roofs become brittle. Cracking and alligatoring inevitably follows, allowing water to penetrate the system causing blisters, cracks and leaks. Compared to other systems, installation of asphalt roofs is energy-intensive (hot processes typically use LP gas as the heat source), and contributes to atmospheric air pollution (toxic, and green-house gases are lost from the asphalt during installation).

Figure #1

7.8 The characteristics per ASTM D 312 of the various grades of asphalt are as follows:

Product	ASTM Type	Softening Point		Flash Point C.O.C* Min
		Min	Max	
140°F (60°C) (dead level)	I	135°F (57°C)	151°F (66°C)	475°F (246°C)
170°F (77°C) (flat)	II	158°F (70°C)	176°F (80°C)	475°F (246°C)
190°F (88°C) (steep)	III	185°F (85°C)	205°F (96°C)	475°F (246°C)
220°F (104°C) (special steep)	IV	210°F (99°C)	225°F (107°C)	475°F (246°C)

* Cleveland Open Cup Method.

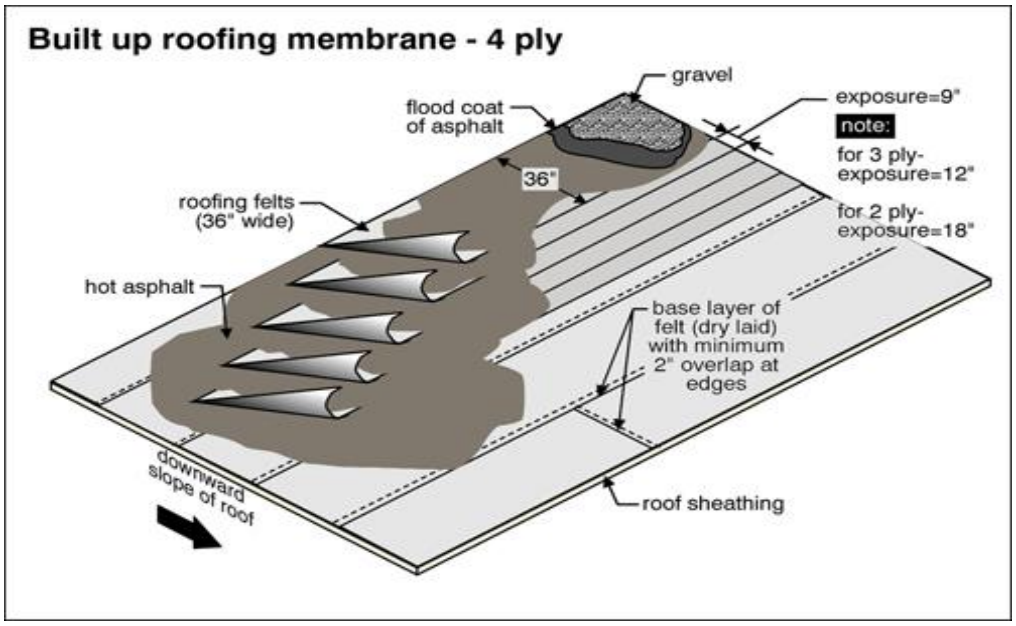
Conklin Company Inc.
TECHNICAL BULLETIN
B-10-18-70
Commercial Roofing System Identification

Various Components of a BUR Roof System

There are a variety of asphalt systems i.e. 3 Ply, 4Ply, 5 Ply, Hot Mopped, Cold Applied, Smooth, Ballasted, Coated and Cap Sheet to mention a few. There are a variety of products used to make these different systems and understanding the different components can help the identification process when examining a core sample. Knowing how the system is built up can help in determining what retrofit system to use. (See figure 2 & 3).

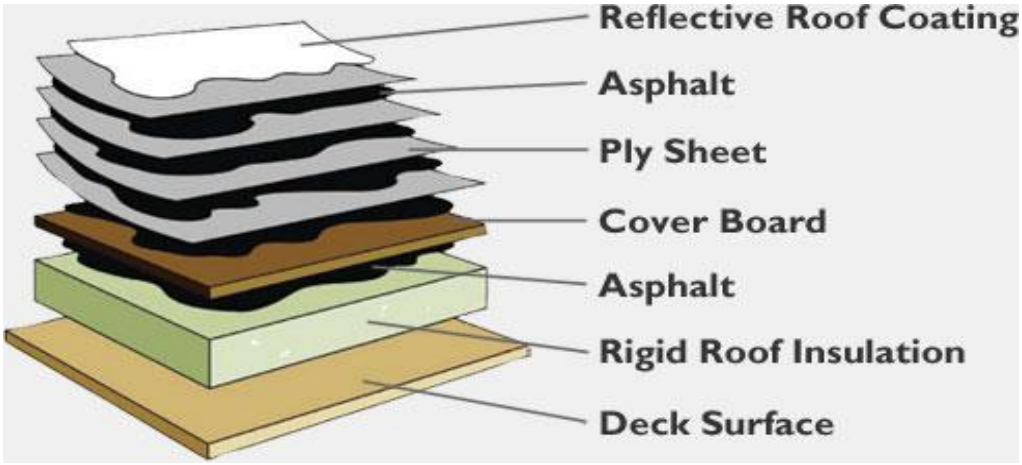
In all cases, Conklin Company Inc. requires a seam treatment on all seams regardless of the type of system.

Figure #2



Conklin Company Inc.
TECHNICAL BULLETIN
B-10-18-70
Commercial Roofing System Identification

Figure #3



65# Smooth Organic

65# Smooth Organic roofing is manufactured from superior quality felt that is saturated with asphalt and then coated on both sides with weathering grade coating asphalt. Then the product is covered on top with mineral surface fines to prevent sticking in the roll. 65# Smooth Organic roofing sheet is applied over the flat roofing deck or insulation before the application of Build-Up Roofing systems. It is also an excellent residential water proofing product for high water areas of roof such as Valleys, Roof edges and low slope roofs. It also is an excellent vapor retardant when installed with hot asphalt.

Roll Roofing or 90# Felt

Asphalt **roll roofing** or membrane is a **roofing** material commonly used for buildings that feature a low sloped **roof** pitch in North America. The material is based on the same materials used in asphalt **shingles**; an organic felt or fiberglass mat, saturated with asphalt, and faced with granular stone aggregate. Roll roofing has been used as a cold applied system or a cap sheet for BUR for many years. These rolls come in a variety of granulated colors or it can have a smooth surface. (See figure #4)

Conklin Company Inc.
TECHNICAL BULLETIN
B-10-18-70
Commercial Roofing System Identification

Figure #4

Ply Sheets, Base Sheets and Felt

Felts and Ply Sheets:
Ply 4 Ply Sheet roofing felt is constructed with a strong glass fiber mat that is coated with the finest quality asphalt, and is designed with optimum porosity to assure a sound, watertight membrane.
Ply 4 Ply Sheet is used as a ply felt in the construction of built-up roofs. It is designed for use in all climate zones and is appropriate for use as a base sheet, as a ply felt, and in the construction of flashing membranes. (See figure 2 & 3)

#75 Base Sheets:
#75 Base Sheet is a premium roofing base sheet constructed with a strong glass mat that is coated on both sides to assure a closed-sheet design to prevent asphalt bleed-through. The sealed sheet also serves as an effective flame retarder for the application of torch-applied modified bitumen membranes.
#75 Base Sheet is engineered for use in the construction of built-up and modified bitumen roofs. It is suitable for nailable specifications, such as plywood, where bleed-through is a concern. (See figure 4)

Modified Bitumen

Modified bitumen's generally use a traditional waterproofing medium -- asphalt -- modified with atactic polypropylene (APP), styrene butadiene styrene (SBS), synthetic rubber or other agents that create a uniform matrix that enhances the physical properties of the asphalt. SBS and APP are the most common bitumen modifiers.
This type of roofing is an evolution of asphalt roofing. It is made from asphalt and a variety of rubber modifiers and solvents. There are several ways of connecting pieces of this material. In a heat application process the membrane is fully adhered to a base sheet and the seams are heated to melt the asphalt together and create a seal. There is also hot-mopped application, similar to how conventional built-up roofs are installed. Cold-applied adhesives and self-

adhesive membranes are two of the more recent options. This material is also referred to as APP, SBS, and SEBS.

Identifying Modified Bitumen

1) Examine roofing material on a building surface to determine if it is asphalt roll roofing or modified bitumen roofing. Try looking at the material edges: modified bitumen roofing is thicker, and its edges are sealed by heating with a torch - you should see a little runout of melted bitumen at the material seams. If there is no runout the roof may have been adhered using some other method. (See figure #5)

2) Measure the width of material between seams parallel to the roof eaves. Since modified bitumen is typically 39" wide and overlapped just an inch or two, the measurement will be wider than lapped 36" asphalt roll roofing whose interstitial spaces will be less than 36".

3) Not only is the modified bitumen usually thicker and more pliable than asphalt roll roofing, it also is better at resisting tearing and breaking. If you find that it is easy to tear into the roof material, (be careful not to cause excess cosmetic damage) then it is probably roll roofing and not mod-bit. (See figure #4)

APP-Modified Bitumen

- Heat welded
- Cold-applied-adhesives
- Extra wear-resistant granule-coated surface,
- Non-woven polyester mat
- Sold in both smooth & granule-coated forms.
- Sold in various thicknesses
- Used: re-roofing & new roofing

(See figure #5)

SBS Modified Bitumen

- Heat welded
- Cold-applied adhesives
- Hot asphalt
- Mechanical-attachment
- Extra strength compared with traditional asphalt-based roofing products, high resistance to elongation & fatigue
- Glass-reinforced polyester mat
- Sold in black, white, other colors, granule-surfaced products;

Figure #5

Conklin Company Inc.
TECHNICAL BULLETIN
B-10-18-70
Commercial Roofing System Identification

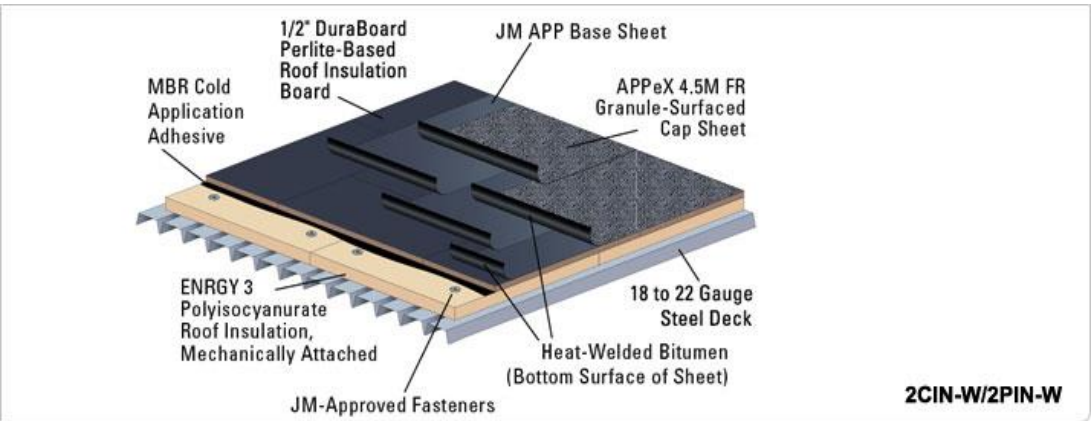
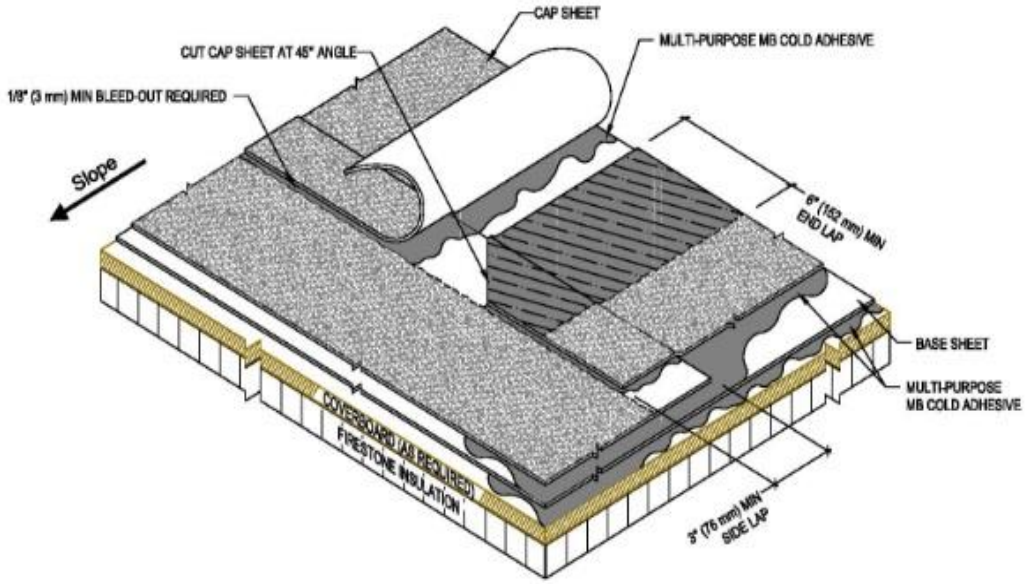


Figure #6



Synthetic Rubber (Thermoset) – This type of membrane roof is made of large, flat pieces of synthetic rubber or similar materials. These pieces are bonded together at the seams to form one continuous membrane. The finished roof's thickness is usually between 30 and 60 mils (thousandths of an inch) (0.75 mm to 1.50 mm). The most commonly used thermoset membrane is EDPM. Other types of related materials are CSPE, CR, and ECR. Thermosets are widely used roofing materials due to their ability to withstand damaging effects of sun-rays and chemicals found on roofs. (See figure #7)

Conklin Company Inc.
TECHNICAL BULLETIN
B-10-18-70
Commercial Roofing System Identification

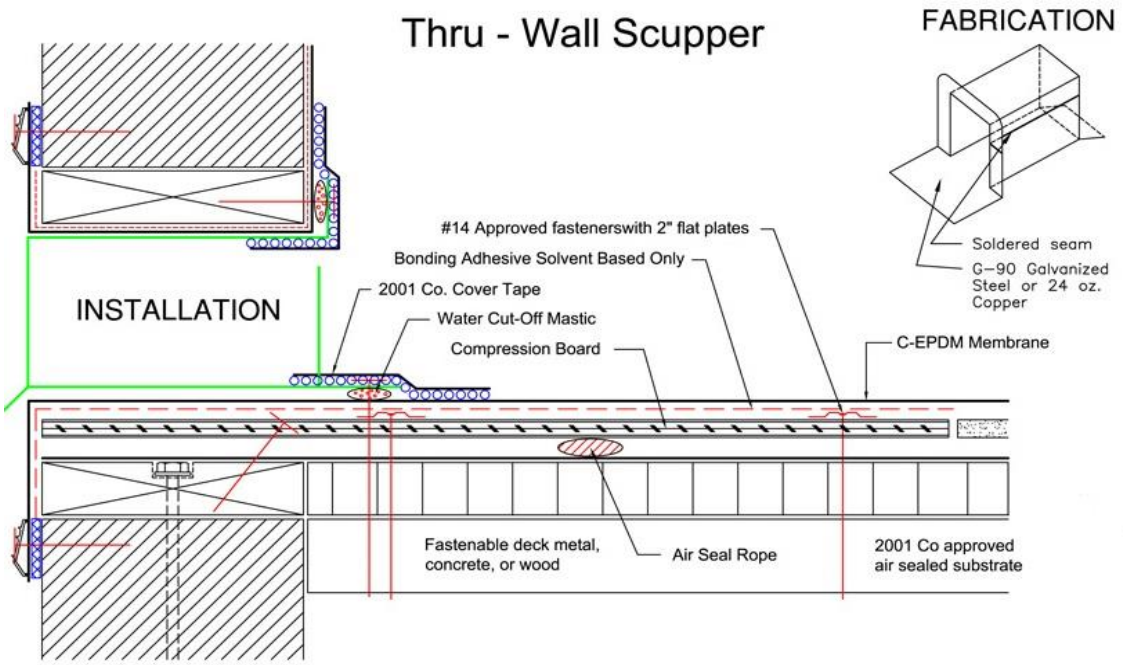
Figure #7

EPDM

EPDM is an extremely durable synthetic rubber roofing membrane (ethylene propylene diene terpolymer) widely used in low slope buildings in the United States and worldwide. Its two primary ingredients, ethylene and propylene, are derived from oil and natural gas. EPDM is available in both black and white, and is sold a broad variety of widths, ranging from 7.5 feet to fifty feet, and in two thicknesses, 45 and 60 mils. EPDM can be installed fully adhered, mechanically attached or ballasted, with the seams of the roofing system sealed with liquid adhesives or specially formulated tape. (See figure #7 & 8)

Conklin Company Inc.
TECHNICAL BULLETIN
B-10-18-70
Commercial Roofing System Identification

Figure #8



CSPE (Formerly Hypalon)

CSPE is a class of polymers that are not physically cured during manufacture, they can be heat welded before they cure on the roof; however, they will cure or vulcanize naturally over some period of time upon exposure to the elements. Once they have cured, their behavior is similar to that of the vulcanized elastomers, and they have become thermoset. White top and Black bottom, may be install with either side up.
Hypalon is a unique material because it is manufactured as a thermoplastic, but, because it cures over time, it becomes a thermoset. Hypalon materials are heat sealed at the seams.

PVC (Polyvinyl Chloride)

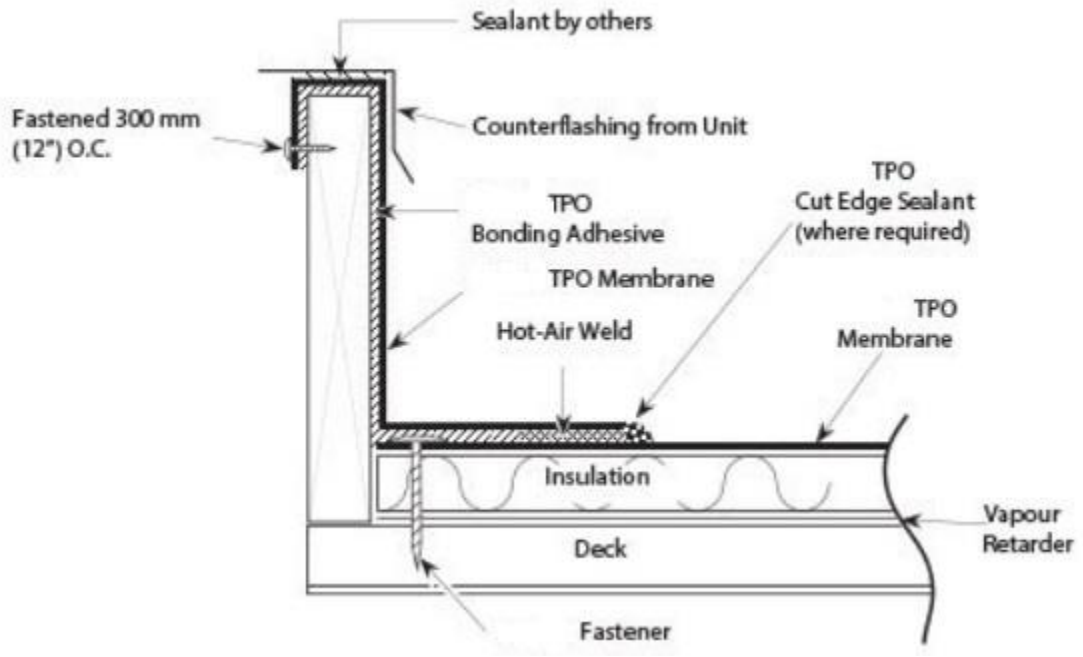
Thermoplastic membranes are based on plastic polymers. The two most common thermoplastic membranes are PVC (polyvinyl chloride) and TPO (thermoplastic polyolefin) which are made flexible through the inclusion of certain ingredients called plasticizers. A number of different products in this category are available, each having its own unique formula. Many PVC and TPO rolls have a gray backing making it difficult to identify. (See figure #9)

Conklin Company Inc.
TECHNICAL BULLETIN
B-10-18-70
Commercial Roofing System Identification

TPO (Thermoplastic Polyolefin)

Thermoplastic membranes are based on plastic polymers. The two most common thermoplastic membranes are PVC (polyvinyl chloride) and TPO (thermoplastic polyolefin) which are made flexible through the inclusion of certain ingredients called plasticizers. A number of different products in this category are available, each having its own unique formula. This product has had many different design flaws since its introduction and the newest formula has issues also. In most cases this product with be stiffer than a PVC with a very slick surface. (See figure #9)

Figure #9



CPA (Copolymer Alloy)

Thermoplastic membranes are based on plastic polymers. The two most common thermoplastic membranes are PVC (polyvinyl chloride) and TPO (thermoplastic polyolefin) which are made flexible through the inclusion of certain ingredients called plasticizers. A number of different products in this category are available, each having its own unique formula. This product has had many different design flaws since its introduction and the newest formula has issues also. In most cases this product with be stiffer than a PVC with a very slick surface. This Elvaloy© - reinforced PVC provides rigged protection from the elements. Its unique chemical formulation is naturally fire-resistant.

Conklin Company Inc.
TECHNICAL BULLETIN
B-10-18-70
Commercial Roofing System Identification

KEE (Ketone Ethylene Ester)

KEE is an abbreviation for Ketone Ethylene Ester, a high-molecular-weight polymer with elastomeric properties and favorable melting properties for thermoplastic processing. Although KEE is most commonly used in roofing, it is also used in geomembranes for secondary containment for petrochemical storage and other industrial chemical applications. It is manufactured solely by DuPont™, under the brand name Elavloy® . There is also an ASTM International standard, ASTM D 6754-10, which regulates the standards for roofing membranes that use KEE. This standard is commonly referred to as the “KEE Standard” and requires that a minimum of 50% by weight of the polymer content of the roofing membrane be KEE.

Self – Adhering Roofing Membrane

Self-adhesive membranes are constructed in a similar fashion to traditional modified bituminous materials. Self-adhesive compounds comprise asphalt, polymers and filler; additionally certain resins and oils may be added to improve adhesion characteristics. The membranes are reinforced with fiberglass, polyester, or a combination of the two. Products designed for exposure to the elements are typically surfaced with mineral granules or other opaque surfacing. The self-adhesive layer is protected with a release film or paper, which is removed during installation of the membrane. These membranes are manufactured either by using the same modified bituminous compound above and below the reinforcement, or by using an APP or SBS modified bituminous compound above the reinforcement and a bituminous self-adhesive compound below the reinforcement. Safe and fast application, environmental friendliness, and use of highly engineered polymer-modified asphalts, are among the numerous advantages of self-adhesive membranes.

There is an ASTM International standard written specifically to address self-adhesive membranes installed beneath exposed roofing materials (widely used as ice dam protection at eaves). This standard is ASTM D1970, “Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection”. Work is in progress to develop new standards to address APP and SBS based self-adhesive membranes used in both steep-slope and low-slope applications. Further, the International Code Council (ICC-ES) has taken steps to revise existing acceptance criteria for roof membranes (AC-75) to include self-adhesive materials.