



PVC Roofing Systems



BUILDING SOLUTIONS

Why Choose PVC?

PVC (polyvinyl chloride) single-ply membranes have provided dependable protection and proven performance since the 1960s, making them a popular choice among roofing consultants and specifiers. PVCs excellent resistance to chemicals, grease, fire and punctures make it an ideal choice for a wide variety of buildings. Versico offers a variety of PVC membrane types that fit virtually any specification, from high-performance KEE HP products to tenacious Type IV PVC.

History of PVC

In 2003, Versico obtained their VersiFlex PVC formulation from a reputable manufacturer with outstanding performance in the PVC market. The basic formulation of this membrane has been successfully used in low-slope roofing applications since 1978.

VersiFlex KEE HP membranes are manufactured from a formulation that was first used in 1985, based on formula recommendations from the DuPont Company. Versico uses the HP (high performance) grade of DuPont Elvaloy, adding even more performance benefits when compared to the standard KEE sheet.

ADVANTAGES OF VERSIFLEX PVC & VERSIFLEX KEE HP



**Fire, Oil, Grease, and
Animal Fat Resistance**



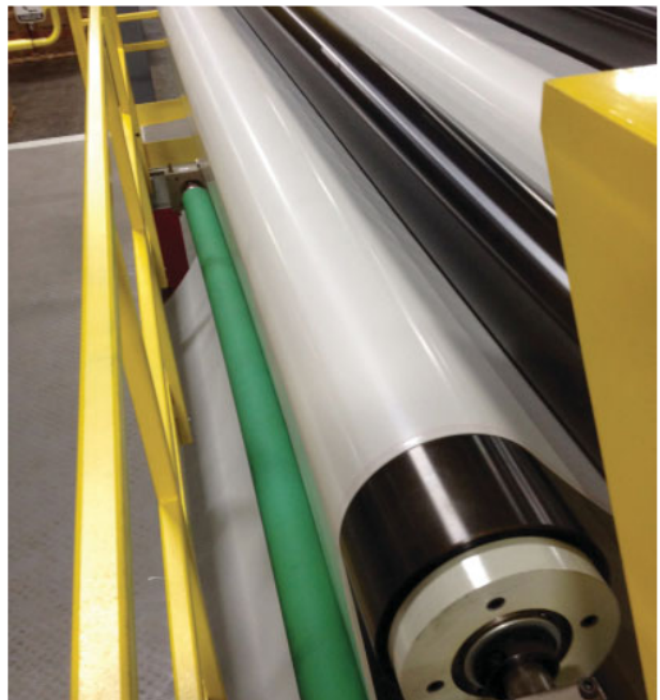
**Wider Window
of Weldability**



Easy to Repair




Quality Manufacturing

Versico's state of the art manufacturing line constantly monitors over 10,000 data points for quality assurance. With computer-controlled extrusion and constant tension control, you can be confident that Versico's high-quality VersiFlex PVC and KEE HP products will provide long-term protection.



Stronger Type IV Construction

VersiFlex PVC and KEE HP membranes provide higher breaking strength, tear resistance, and elongation properties than typical ASTM D4434 Type III/IV PVC Standards. All of Versico's bareback and VersiFleece PVC and KEE HP membranes exceed the ASTM standards.

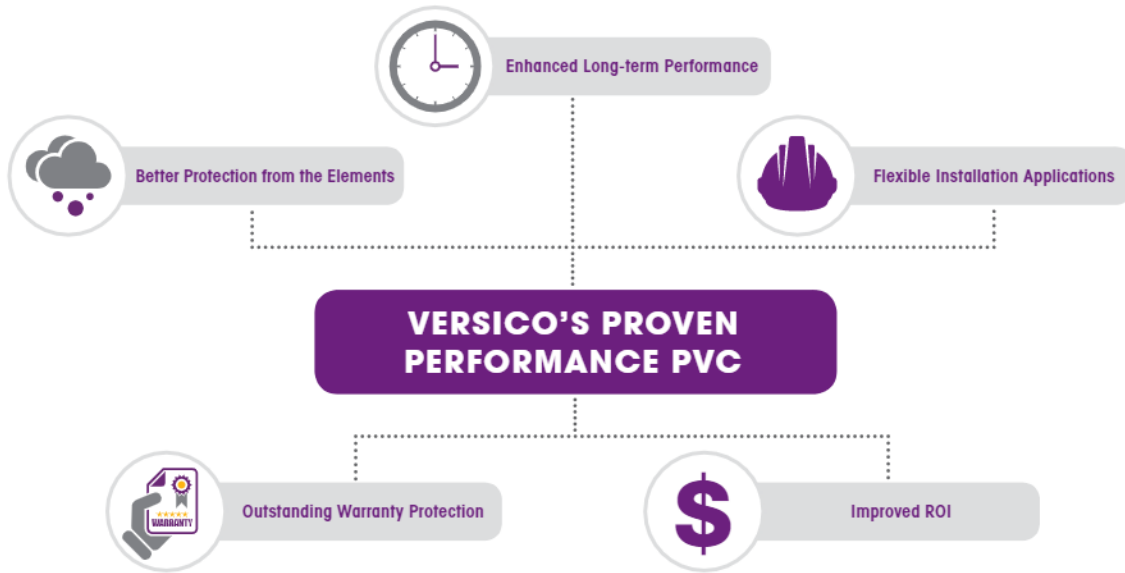
	Type III	Type IV	% Increase	VersiFlex PVC	VersiFlex KEE HP
 <p>Breaking Strength</p>	200 lbf/in	275 lbf/in	38%	330 lbf/in 65 %	320 lbf/in 60 %
 <p>Elongation</p>	15%	25%	66%	25% 66 %	30% 100 %
 <p>Tearing Strength</p>	45 lbf	90 lbf	100%	130 lbf 190 %	125 lbf 180 %

Warranty Options

	VersiFlex PVC Membranes					VersiFlex KEE HP Membrane				
	10-Year	15-Year	20-Year	25-Year	30-Year	10-Year	15-Year	20-Year	25-Year	30-Year
50-mil	X	X				X	X	X		
60-mil	X	X	X			X	X	X	X	
80-mil	X	X	X	X		X	X	X	X	X

Versico's Proven Performance PVC vs. Lower Performance PVC

PVC Roofing membranes have proven to be successful in low-and high-slope applications for more than 50 years; however, some manufacturers are now producing and promoting a lower-cost, lower-performance PVC membrane. These membranes are considered lower-performance products and may not provide the strength and durability that has been traditionally attributed to PVC membranes.



Benefits of Versico's Proven Performance PVC

Protection from the Elements: The weathering package in any membrane is predominately contained in the material above the scrim or fabric reinforcement. Thicker membranes usually carry longer warranties due to the increased amount of high-performance materials used in the membrane. Lessening this protection layer only results in reduced performance against the elements.

Outstanding Warranty Protection and Return on Investment: Oftentimes, lower-performance PVCs are selected because of their low cost, but when the initial installed costs are weighed against long-term performance and available warranty coverage, low-cost, lower-performance PVC can end up being more expensive than its price suggests. Because the membrane is actually only a small portion of the overall roof system's installed cost, the small up-front savings achieved by using lower-performance PVC often cost the building owner more money in the long run.

Versico's VersiFlex proven-performance PVC membranes have a monolithic formulation above the scrim that ensures long-term weatherability and achieves the maximum amount of protection against the elements.

Versico's Proven Performance PVC: Though its initial cost is slightly higher than that of lower-performance PVC, proven-performance PVC membrane provides a number of advantages which can actually make it less expensive than lower-performance PVC over the life of the roof system. Because of its high quality and exceptional durability, you can rest assured that your building will have outstanding warranty protection. Versico's Total System warranties reflect a commitment and ability to address any warranty issue for up to 30 years. Versico also offers warranties that protect against hail and accidental punctures. Versico has tested and will offer enhanced wind speed warranties for up to 120 mph.

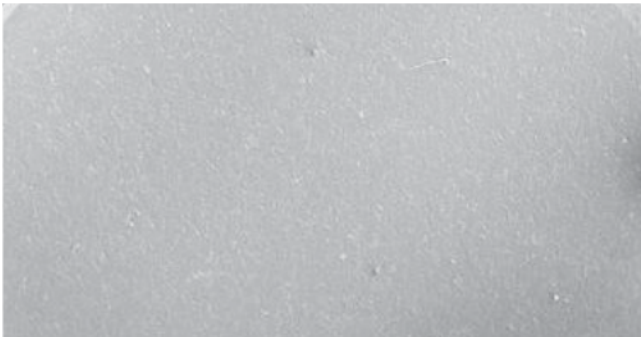
Lower-Performance PVC: Lower-performance PVC membrane is often selected for a project because of its low cost, but low initial cost is not always indicative of a good value. Most lower-performance PVC manufacturers offer restricted warranties, typically lasting no longer than 20 years, but No Dollar Limit warranties are rarely an option. These manufacturers limit their liability to the original installed cost of the roofing system over the life of the warranty, and most of these manufacturers do not offer warranty options for hail or accidental punctures. Manufacturers of lower-performance PVC membranes may also limit their liability to gale force wind warranties.

Long-term Performance

Versico's Proven-Performance PVC: Xenon-Arc and long-term heat aging tests show that Versico's VersiFlex PVC exceeds the highest industry standards. Versico's PVC membrane formulation uses only the highest-quality raw materials, including antioxidants, UV absorbers, light and heat stabilizers, and critical biocides, significantly enhancing long-term performance.

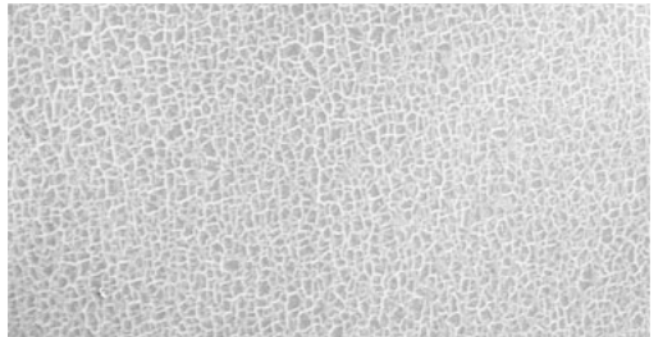
Lower-Performance PVC: One of the easiest ways to decrease the cost of a PVC membrane is to reduce the quality and quantity of its weathering and stabilization package. This lowers the material's cost, but also negatively affects the long-term performance of the roofing system.

SIMULATED WEATHERING
(EQUIVALENT TO 8 YEARS IN PHOENIX, AZ) 20X MAGNIFICATION



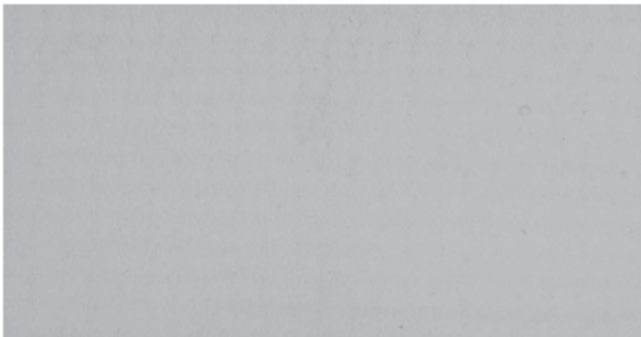
Versico VersiFlex PVC

SIMULATED WEATHERING
(EQUIVALENT TO 8 YEARS IN PHOENIX, AZ) 20X MAGNIFICATION



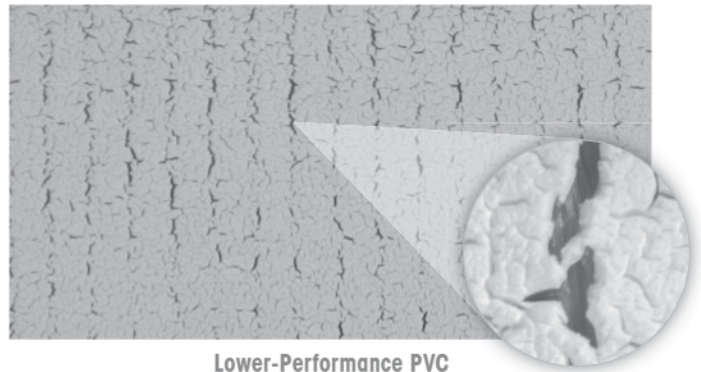
Lower-Performance PVC

SIMULATED WEATHERING
(EQUIVALENT TO 25 YEARS IN PHOENIX, AZ) 20X MAGNIFICATION



Versico VersiFlex PVC

SIMULATED WEATHERING
(EQUIVALENT TO 25 YEARS IN PHOENIX, AZ) 20X MAGNIFICATION



Lower-Performance PVC

Installation Flexibility

Versico's Proven-Performance PVC: Versico's PVC membranes can be used in a variety of assemblies, including plaza decks, roof gardens, and solar applications.

Lower-Performance PVC: Because lower-performance PVC membranes are not intended for harsh conditions and complicated applications, manufacturers often prohibit their use in plaza decks, vegetated roofs, and solar panel applications.

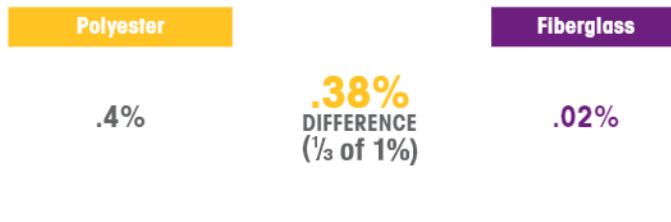
Protect Your Investment: Ensure that the company providing your PVC membrane approves its use in the harshest environments including plaza decks, roof gardens, and solar applications.

Polyester or fiberglass: which is the better reinforcement for thermoplastic single-ply roof membranes?

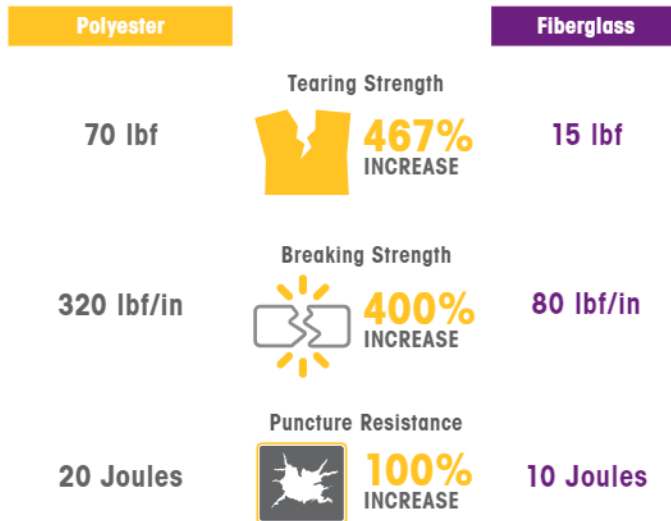
Today, over 99% of all thermoplastic single-ply roofing membranes use a polyester reinforcement, yet a few holdouts still contend fiberglass reinforcement is better.

Polyester and fiberglass reinforcement both help to provide dimensional stability to thermoplastic membranes. Polyester reinforcement, however, offers the added benefits of enhancing the membrane's resistance to fatigue and punctures. Though polyester-reinforced membranes are traditionally used in mechanically fastened assemblies, they have also been used successfully in adhered systems for many years. Fiberglass-reinforced membranes, on the other hand, only provide marginal fatigue resistance, limiting their use to fully adhered assemblies or perhaps applications where the membrane is fully protected by a top surfacing material.

Lineal Dimensional Stability (% Difference)



Tearing/Breaking/Puncture (% increase)



Wind Uplift

Wind uplift tests revealed that in mechanically fastened systems, polyester-reinforced PVC offers better resistance to tearing around fastener plates than fiberglass-reinforced PVC. While using fiberglass-reinforced PVC in a mechanically fastened system is not recommended, the increased tear resistance of polyester offers an advantage without any downside. In fact, when tested in adhered assemblies, polyester-reinforced membrane delivered superior adhesion and equal or greater wind uplift resistance than fiberglass-reinforced material.

Dimensional Stability

The slightly higher dimensional stability provided by fiberglass reinforcement is not a benefit in fully adhered assemblies where membranes are held in place by the adhesive. Since the adhesive provides substantially more holding power than forces exerted by the membrane, no membrane movement should occur.

Puncture

Dynamic puncture tests conducted using ASTM D5635-04 show that polyester reinforcement provides remarkably better results. Test results for fiberglass-reinforced PVC yielded 10.0 Joules, while the polyester-reinforced PVC yielded 22.5 Joules. Polyester-reinforced membranes are also easier to handle and will conform better to irregular surfaces than the more rigid fiberglass-reinforced membranes.

VERSICO'S PVC AND KEE HP MEMBRANES



VersiFlex PVC

VersiFlex PVC is a three-layer polyester-reinforced membrane that is specially designed for long-term performance.

- Long-term resistance to solar UV, ozone and oxidation
- Sustainable, recyclable and energy efficient; can contribute toward LEED® credit requirements
- Wide window of weldability provides easy installation
- Available in white, gray, and tan, and offered in 50, 60-, and 80-mil thicknesses



VersiFlex KEE HP

VersiFlex KEE HP is manufactured using DuPont Elvaloy KEE HP, a resin modifier that provides permanent flexibility, improved UV resistance and long-term weathering performance. Elvaloy also eliminates the need for a lacquer coating, which over time will weather away and lose its resistance to dirt and microbial growth.

Enhanced strength and durability make VersiFlex KEE HP ideal for applications in which the roofing membrane may be exposed to harsh chemicals and conditions such as acid rain, grease, air-conditioning coolants and intense sunlight.

- Excellent long-term weldability
- Increased cold weather flexibility
- Easier repairs, modifications and maintenance on roof systems
- Available in white, gray, and tan, and offered in 50, 60-, and 80-mil thicknesses



VersiFleece PVC

VersiFleece PVC polyester reinforced membrane offers exceptional weatherability, flexibility, and toughness due to its polyester reinforcing scrim and polyester fleece backing. The polyester reinforcing scrim provides the sheet with added breaking strength, tear strength and puncture resistance for fully adhered or mechanically attached applications; the fleece backing adds to the puncture-resistance of the membrane and provides a built-in separation layer against rough concrete decks or existing asphaltic-based roofing systems. Years of proven PVC formulation performance helps to ensure the membrane remains pliable and weldable as it ages.

- Super wind uplift performance
- Exceptional puncture strength
- Increased labor savings due to wide sheet size
- Available in white, gray, and tan, and offered in 115- and 135-mil thicknesses

VersiFleece KEE HP

VersiFleece KEE HP polyester reinforced membrane offers exceptional weatherability, flexibility, and toughness due to its polyester reinforcing scrim, polyester fleece backing, and DuPont Elvaloy KEE HP copolymer. The polyester reinforcing scrim provides the sheet with added breaking strength, tear strength and puncture resistance for fully adhered or mechanically attached applications; the fleece backing adds to the puncture-resistance of the membrane and provides a built-in separation layer against rough concrete decks or existing asphaltic-based roofing systems. Elvaloy KEE HP, a solid plasticizer that won't migrate out of the sheet over time, helps to ensure the membrane remains pliable and weldable as it ages and reduces the amount of smoke generated during the welding process.

- Provides superior wind uplift performance
- Enhanced toughness, durability, and puncture-resistance
- Low-volatility KEE HP plasticizer won't migrate over time
- Available in white, gray, and tan and offered in 105-, 115-, and 135-mil thicknesses

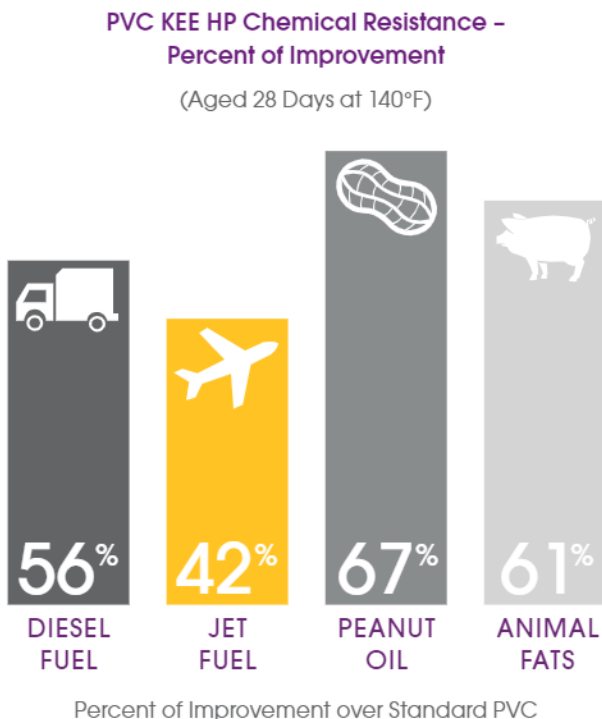
VersiFlex KEE HP

Traditionally, PVC membranes have been formulated using liquid plasticizers to create a more flexible product. As technology improved, the use of higher molecular weight plasticizers increased, increasing the performance and stability of PVC roofing membranes. In 1977, DuPont developed a higher molecular weight solid plasticizer Elvaloy KEE, which would not migrate from the PVC membrane like traditional liquid plasticizers thus increasing the performance and stability of the PVC membrane.

Recommended for roofing membranes in 1991, DuPont developed an even higher molecular weight solid plasticizer and labeled it Elvaloy KEE HP. The HP refers to "high performance." Elvaloy KEE HP offered increases in permeance, thermal stability and durability, improved resistance to dirt and microbial growth pickup, and flexibility while extending the low and high temperature performance limits of standard KEE. Since then, Elvaloy KEE HP has been used in a variety of industries and products, including roofing membranes, pond liners, and industrial films, consistently providing longer term performance and ease of use.

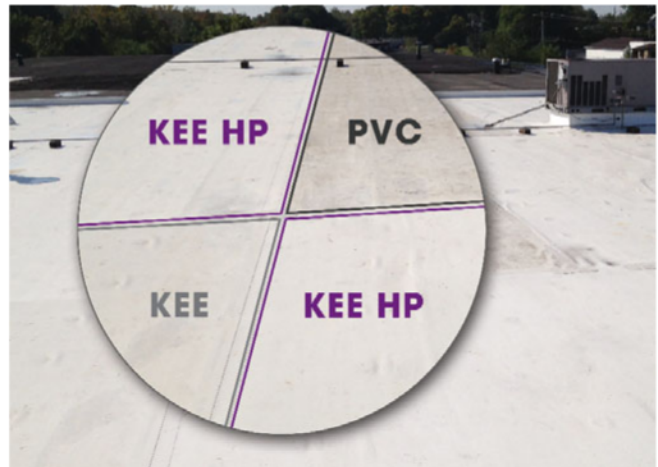
Chemical Resistance

The increased stability of the KEE HP provides a greater resistance to chemicals, pollutants, and abrasion. KEE HP is able to resist harsh chemicals, acid rain, industrial pollutants, oils, fats, and jet fuel. This resistance is due to its increased molecular weight and stability. Harsh chemicals can extract liquid plasticizers out of PVC membranes or cause premature degradation in other roofing products. Because KEE HP plasticizers are stable and will not migrate out of the membrane, the membrane is protected from the effects of harsh chemicals.



Improved Aesthetics

Versico's KEE HP membranes are also more resistant to microbial growth and dirt pickup, ensuring that the membrane stays cleaner and whiter than the standard KEE membranes, which stay cleaner than the standard PVC membranes. This not only cuts down on required rooftop maintenance but also maintains the reflectivity values and aesthetic appeal of the roofing system, especially on sloped roofs that would be visible to the public.



A comparison of a rooftop in New Jersey illustrates the improved aesthetics achieved with KEE HP

Weldability

When Versico upgraded from KEE to KEE HP, the window of weldability improved by 51%. KEE HP's enhanced flexibility provides an easier, faster installation. In testing, the membranes were welded with a Leister® robotic heat welder at various temperatures and speeds. The results show that KEE HP significantly widens the window of weldability.

Thermal Performance

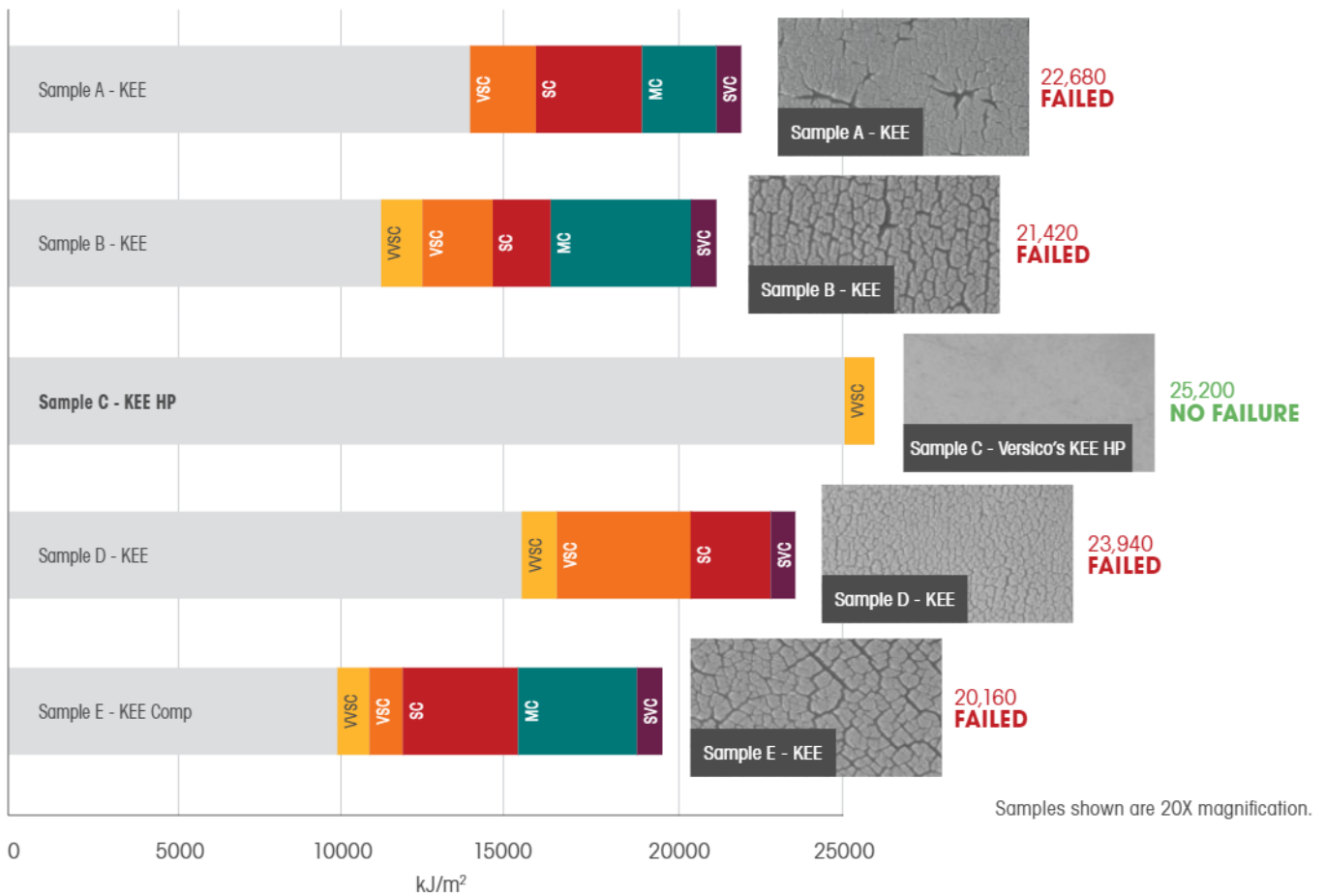
The stability of DuPont's Elvaloy KEE HP, as used in Versico's KEE HP, provides enhanced resistance to UV degradation and heat-related failures. With traditional liquid plasticizers, or other lower molecular weight plasticizers, UV exposure causes plasticizer migration, which degrades the membrane over time. The increased stability of the KEE HP plasticizer enables the membranes to withstand severe heat and UV exposure without suffering the degradation found in other lower molecular weight plasticized PVCs. This provides longer-term weatherization and performance for the life of the roofing system.

To ensure long-term performance in the most severe climates and conditions, Versico's KEE HP membrane, along with other membranes, were exposed to Xenon Arc testing at conditions typically used to test TPO and EPDM membranes, which are more stringent than the conditions traditionally used to test PVC and standard KEE membranes.

A variety of PVC membranes were tested, which were enhanced with DuPont's Elvaloy standard KEE and KEE HP. Versico's KEE HP is by far the best performing membrane, surviving the severe exposure of 25,000 kJ/m² without cracking and only very, very slight crazing occurring on the membrane.

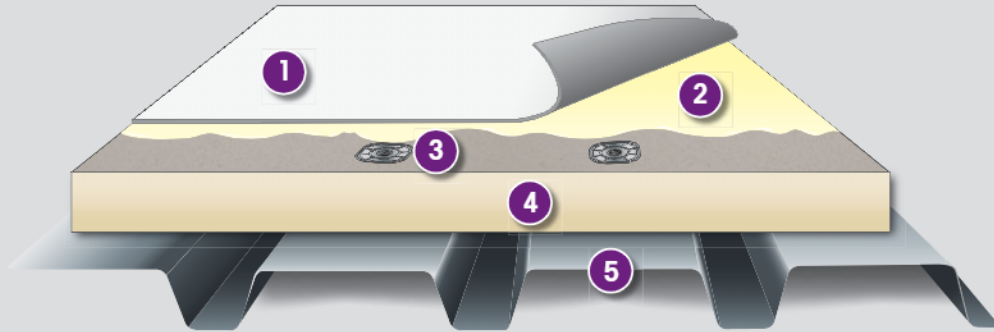
XENON ARC AGING (ASTM D7613)

0.70 W/m² Exposure @ 340nm, 80°C BPT • Inspected after every 500 hrs



VVSC	Very, very slight crazing (just able to observe under 10X)	MC	Moderate crazing (can observe within 24" from eye)
VSC	Very slight crazing (cannot see with unaided eye, but easily observed under 10X)	SVC	Severe crazing (can observe from 6 ft away, similar to alligatoring)
SC	Slight crazing (able to observe with unaided eye within 12" from eye)		

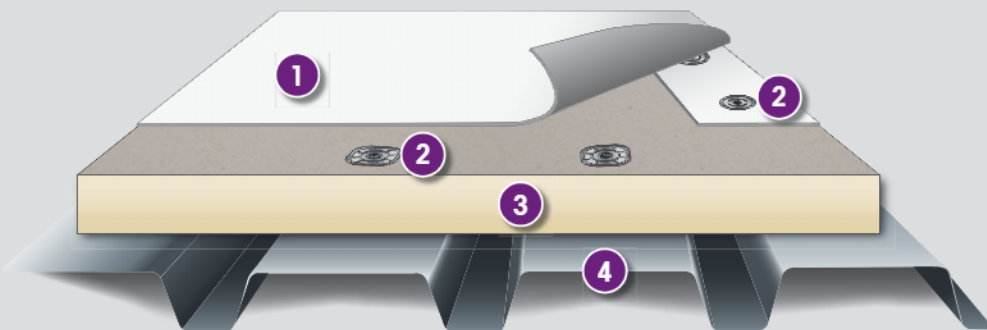
VersiFlex Fully Adhered PVC Roofing System



Typical Application

- 1 VersiFlex 50-, 60-, 80-mil Reinforced Membrane
- 2 Bonding Adhesive
- 3 Versico Fasteners and Plates
- 4 Approved Versico Insulation
- 5 Approved Roof Deck

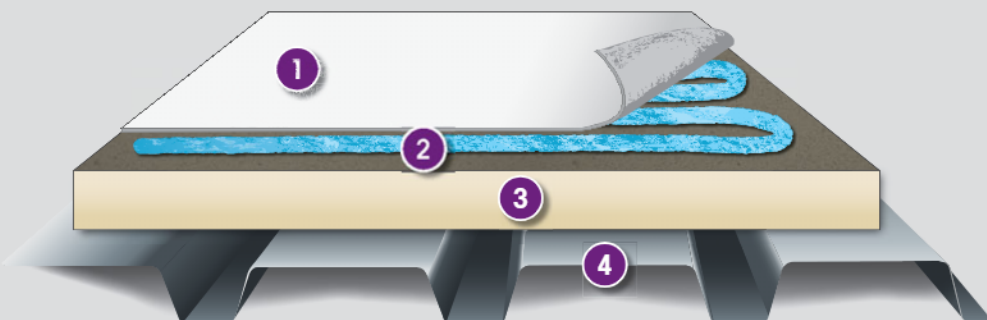
VersiFlex Mechanically Attached PVC Roofing System



Typical Application

- 1 VersiFlex Reinforced Membrane
- 2 Versico Fasteners and Plates
- 3 Approved Versico Insulation
- 4 Approved Roof Deck

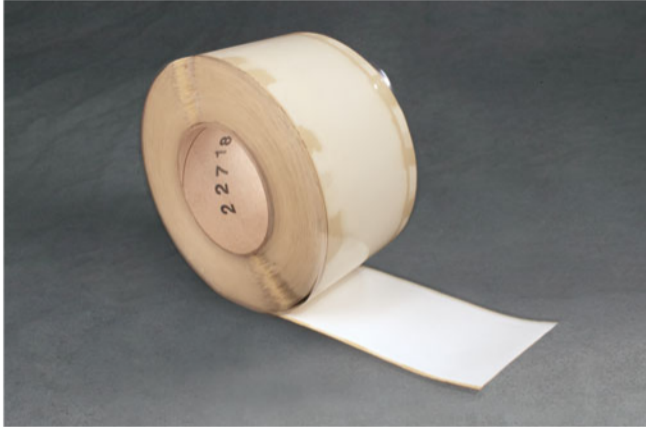
VersiFleece Fully Adhered PVC Roofing System



Typical Application

- 1 VersiFleece PVC and KEE HP Membrane
- 2 Elongating Flexible DASH Adhesive
- 3 Approved Versico Insulation
- 4 Approved Roof Deck

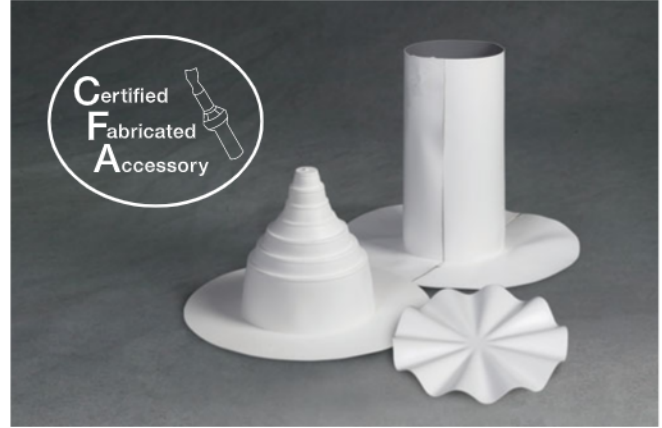
LABOR SAVERS



VersiFlex PVC Pressure-Sensitive Cover Strip

VersiFlex PVC Pressure-Sensitive (PS) Cover Strip is a groundbreaking new product designed to help contractors save time, labor, and money. Versico's new PVC PS Cover Strip is used for stripping-in flat metal edging and eliminates the need for costly PVC-coated metal or two-piece clip-on edge metal. During field testing and evaluation, contractors called this product a "game changer."

- Fast, simple installation with no welding required
- Pressure-sensitive adhesive is compatible with a variety of metal finishes, including Kynar®-coated metal



Accessories

Versico provides dozens of prefabricated, standard order, in-stock accessories, as well as many custom order accessories, to waterproof even the most difficult and unique penetrations. No matter what kind of intricate detail is present on your rooftop, Versico has an accessory to meet your needs.



Universal Corners

Versico's VersiFlex PVC Universal Corners are a part of the Certified Fabricated Accessory (CFA) program. CFAs are the only factory-fabricated PVC accessories that meet the stringent quality tolerances required to be included in a Versico warranted roofing system.



VersiFlex PVC HydroBond™ Water-Based Adhesive

A water-based, wet lay-in, one-sided dispersion adhesive. Compatible with VersiFlex PVC and KEE HP, and VersiFleece TPO, PVC and KEE HP membranes, this product is ideal for bonding PVC membranes to various porous and non-porous substrates.

Top 10 Reasons to Choose PVC

PVC is the oldest thermoplastic in the world and the only thermoplastic that does not use 100% fossil fuels. Over 50% of PVC (chlorine) is derived from the salt in salt water and the remainder of the formulation is from natural gas; both are extremely abundant in the world.

1. **Heat Weldability:** Welded seams become solid and monolithic, which helps to prevent leaks. The welding of PVC roofing membranes has a bleed-out in the weld, which is visual confirmation the weld is good. Other thermoplastics do not have a bleed-out of the weld.
2. **Fire Resistant:** PVC is the most fire-resistant of all roofing membranes. PVC will not support fire like other thermoplastics and is self-extinguishing when the flame source is removed.
3. **Chemical Resistance:** PVC is one of the most chemical-resistant single-ply membranes. It has high resistance to animal fats from restaurants, jet fuels from airports, acids, and various other chemicals that might get on the roof and cause damage to other membranes.
4. **Resistance to Ponding Water:** PVC offers excellent resistance to ponding water and is even used to line swimming pools.
5. **Cold Temperature Flexibility:** KEE HP-modified PVC is flexible in temperatures as low as -56°F (-48°C).
6. **Tolerant to High Temperatures:** PVC is compounded with heat stabilizers, which help make it high temperature-tolerant.
7. **Easy to Work With:** PVC is very flexible and easy to work with, which helps to cut down on installation errors.
8. **Wide Window of Welding:** The temperature range in which PVC can be effectively welded is wide, allowing a better chance for good welds and fewer leaks.
9. **Confidence in Welding:** When welded, the PVC membrane will "bleed out". The darker-colored bottom ply offers an excellent visual cue to the welder, assuring a better weld.
10. **Shelf Life:** No shelf life, does not start to oxidize or crosslink.



A SINGLE SOURCE FOR SINGLE-PLY ROOFING

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