JOHNS MANVILLE & COOLEY GROUP

The Power of Two Companies With a Combined History of More Than 250 Years

25+ YEAR PROVEN PVC FORMULATION HISTORY

Johns Manville (JM) and the Cooley Group have a unique strategic partnership. It allows us to offer a successful and proven PVC membrane with a 25+ year history in the market. The Cooley Group developed C3 with DuPont™ Elvaloy® KEE in 1988 and commercialized it in 1990. Shortly after launching, the naming evolved to C3Plus by adding a patented Aramid yarn edge along the fastener edge of all full rolls. The proprietary Elvaloy® KEE formulation, with proven real-world results, has not once changed in its 25+ years of production; despite the introduction of various grades or amounts of DuPont™ Elvaloy® KEE offered by other manufacturers. (See cooleygroup.com/building-products)

Quick History: DuPont™ Elvaloy® KEE, a solid high molecular weight polymer, has been in the market since 1973. It was developed as an alternative to liquid plasticizer to improve the long-term performance of thermoplastic materials.

Did You Know? DuPont™ Elvaloy® KEE HP is mainly promoted for cable jacket applications. However, it had a brief history in the PVC roofing membrane market in the 1990s. The formulation was sourced by a single manufacturer who is no longer in the roofing membrane business.

JM PVC - Testing, Data and Performance

Testing

In 2006, JM PVC (Cooley C3 Plus) was one of six membranes used to study chemical resistance by Simpson Gumpertz & Heger (SGH).

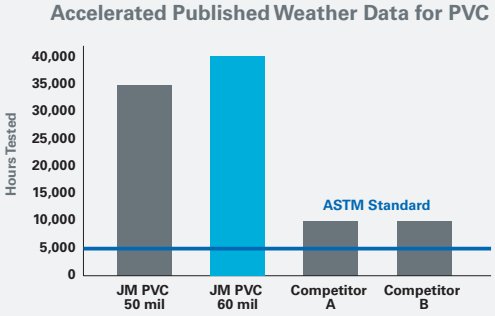
A white paper citing this study was then published by Carl G. Cash, P.E., A. G. Davies, Jr., D. L. Niles, and L. C. Carey titled "Chemical Resistance of Various Single Ply Roofing Membranes." It states, "The PVC/KEE membrane is the most resistant to the chemicals we tested." JM PVC membrane came out on top with water, HVAC oil, canola oil, 1 N acid, pH 11 base and kerosene.

"JM PVC (Cooley C3 Plus) ranked the highest for chemical resistance."

Data

It is critical to make sure that the reporting test methods and data are relevant to roofing and that the product has a proven real world track record.

Accelerated weather testing for roofing membrane is conducted with florescent light and UV exposure to detect cracking, crazing or discoloration. ASTM G154 or ASTM G155 requires a PVC roofing product to pass 5,000 hours. Third-party accelerated weather testing reveals that **JM PVC 60 mil surpassed over 40,000 hours!**



Performance

A 40-mil, JM PVC fleece backed roof was installed with hot asphalt in 1992 in Alpine, Utah. It was harvested in 2010 and put through the same rigorous ASTM testing standards that our new membranes undergo. The results proved ultimate durability in the harshest conditions, even on thinner membranes.

The comparison against ASTM requirements show this roof would pass, even after more than 18 years.

Tested Physical Properties	Test Method	ASTM D4434 Requirements	Johns Manville 50 Mil Fleece Back	Exposed 40 Mil Sample Avg.	Unexposed 40 Mil Sample Avg.
Thickness, min, in.	ASTM D751	±10% from Nominal	0.050 (Membrane only Nominal)	0.040	0.043
Thickness OverScrim, min, in.	ASTM D7635	0.016	0.020	0.0187	0.0191
Low Temperature Bend, °F	ASTM D2136	Pass	Pass @ -40	Pass @ -40	Pass @ -40

Thickness Over Scrim

1. Thickness over scrim
2. Scrim
3. Thickness under scrim
4. Fleece back in asphalt

Conclusion

In roofing, time is the great equalizer. JM's PVC has worked for more than 25+ years in all U.S. climate conditions, with no membrane degradation failures. Accelerated testing and promise of performance is no match for a 25+ year proven history. Think about the consequences of a roof leak or roof failure in your building or operation. Yes, it will get fixed eventually, but think about the disruption. Are you willing to take this risk?

- With JM PVC, there has been more than 600 million square feet of installed PVC going back 25-plus years in real world conditions.
- Johns Manville is a 160+ year old company financially backed by Berkshire Hathaway.
- Our partnership with the Cooley Group provides a unique opportunity to share best practices, while having the ability to sell a proven product.

JM PVC meets the required ASTM D2136 low temperature bend at -40°F.

Installation of any roofing system in sub-zero temperatures could bring additional challenges, lacking sufficient thermal energy for heat-welding, adhesive restrictions and overall personnel working conditions.

More than 600 million square feet of installed PVC going back 25-plus years in real world conditions.

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