

## The Facts About TPO Performance Testing

With more than 25 years of manufacturing and practical, real-world experience, there is still no equal to Carlisle SynTec Systems' Sure-Weld® TPO single-ply roofing membrane. TPO continues to be the fastest-growing segment in the commercial roofing industry, and your building deserves a TPO roofing system manufactured by the company that has been at the forefront of research, development, and technology since the inception of TPO as a roofing membrane: Carlisle SynTec Systems.

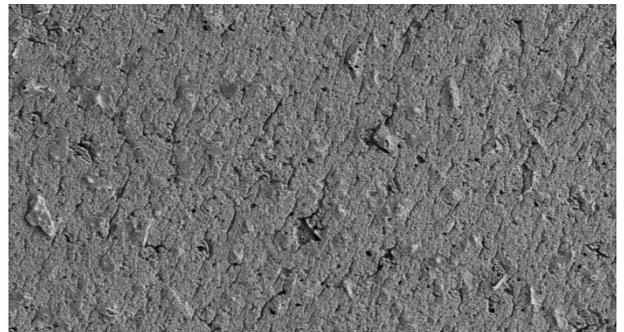
Carlisle, a long-time pioneer in the roofing industry, recently conducted the industry's largest and most comprehensive TPO study, in which all testing was conducted using the test methods and conditions as defined within ASTM D6878. Carlisle's study tested seven TPO membranes from manufacturers located in the United States and international locations for a wide range of properties that impact real-world rooftop performance. Highlights from this study can be found at [www.carlisesyntec.com](http://www.carlisesyntec.com). The results clearly show that Carlisle's Sure-Weld TPO is the top performer when evaluating a wide range of physical attributes including heat and UV resistance.

### WHY IS IT IMPORTANT TO FOLLOW ASTM STANDARDS WHEN CONDUCTING PERFORMANCE TESTING?

ASTM, the world's largest developer of standards, is an international organization that develops and publishes voluntary, consensus-based technical standards for a wide range of materials, products, systems, and services. ASTM D6878, the Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing, is the consensus-derived document that was reviewed and approved by the entire ASTM membership, which includes roofing membrane manufacturers, building scientists, consultants, and raw material suppliers.

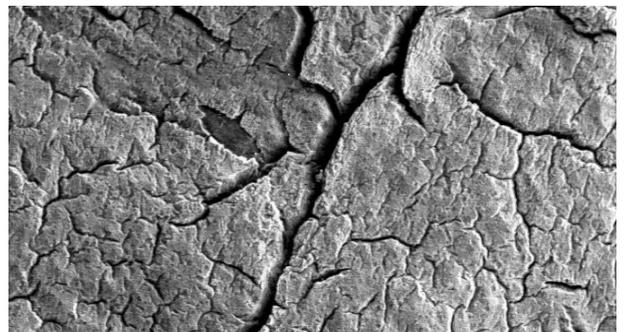
***Be cautious of studies that do not follow ASTM standards. Predicting performance based on non-standard testing provides little benefit to the manufacturer, the material specifier, or the building owner.***

By creating their own testing methods and evaluation criteria, any manufacturer can stack the deck and develop tests that will make their products seem superior: for example, subjecting TPO to heat aging at a temperature above the ASTM standard of 240°F, and then evaluating the membrane for other performance characteristics not related to heat resistance. Extremely high-temperature heat aging will expedite the time to failure. Extremely high-temperature heat aging will expedite the time to failure, but temperatures above those specified within the ASTM standard can result in effects to the membrane that would not occur in real-world applications. Adding other tests after the heat aging process can produce results that depart even further from real-world conditions. This type of testing has not been accepted by ASTM or any consensus-based organization. By ensuring that TPO testing follows



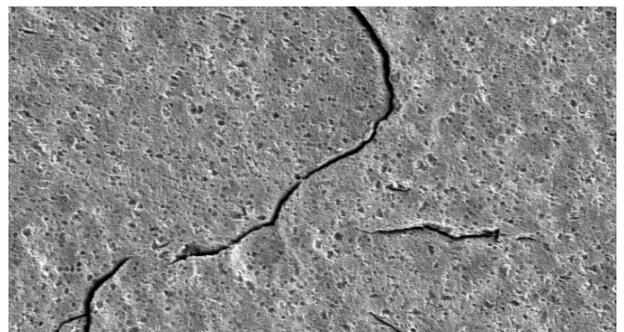
**60-mil Carlisle Sure-Weld TPO**

*After 30,240 kJ/m<sup>2</sup> Xenon Arc exposure | 100x magnification*



**60-mil "Competitor C" TPO**

*After 25,200 kJ/m<sup>2</sup> Xenon Arc exposure | 100x magnification*



**60-mil "Competitor A" TPO**

*After 25,200 kJ/m<sup>2</sup> Xenon Arc exposure | 100x magnification*

ASTM D6878, a consumer can avoid being misled.

A truly independent study (not commissioned by a TPO manufacturer) on long-term TPO performance was recently conducted by TrinityIERD, a leading independent testing lab. Results from this study also showed that Carlisle’s TPO membrane was the leading performer when subjected to heat aging conditions specified within ASTM D6878. Specifically, the test laboratory concluded, “Sample B (Carlisle TPO) underwent the longest duration of heat exposure of all four samples, without cracking upon bend testing after 68 weeks of heat aging,” – more than double the ASTM standard.

### WHY IS IT IMPORTANT TO USE THE CORRECT EQUIPMENT WHEN CONDUCTING RESEARCH TESTS?

To achieve accurate test results, it is essential that the proper testing equipment is utilized. The xenon arc weatherometer is recognized as providing the most realistic and severe method to duplicate UV exposure in a laboratory environment by exposing membrane samples to the entire spectrum of sunlight, including ultraviolet (UV), visible light, and infrared (IR), as well as ozone, heat, and water spray.

Be cautious of studies that do not utilize the xenon arc testing apparatus specified in ASTM D6878, as the use of non-standard equipment makes it impossible to compare the test results to those achieved through xenon arc testing.

#### HEAT AGING FOLLOWING ASTM D6878 PROTOCOL



Carlisle Sure-Weld TPO – 60 Weeks (No Failure)



“Competitor C” TPO – 37 Weeks



### WHY IS IT IMPORTANT TO HAVE REAL-WORLD EXPERIENCE?

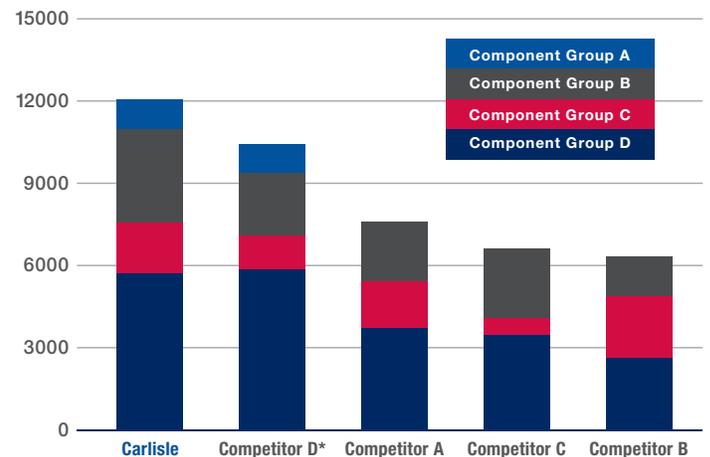
Carlisle has the longest track record in the TPO industry (over 25 years) and the most membrane installed in the field (more than 5 billion square feet), both of which provide valuable insight into the correlation between laboratory testing and field performance. Developing a single-ply membrane that will stand the test of time in the real world – not just in the lab – requires a broad knowledge of the interrelationships of many physical characteristics.

Carlisle continues to lead the industry with its high-performance OctaGuard XT™ weathering package. Incorporated into all Sure-Weld membrane and accessories, OctaGuard XT technology is comprised of eight performance-enhancing ingredients, including three heat-stabilizing antioxidants and three UV light stabilizers, as well as organic and inorganic UV absorbers. When combined, these eight ingredients provide a weathering package that is second to none in the TPO industry.

Carlisle, the world’s leading manufacturer of TPO membranes, is fully invested in providing quality roofing systems. The results of independent lab tests performed per ASTM D6878 standards, coupled with two decades of exceptional rooftop performance, prove there is still no equal to Carlisle’s Sure-Weld TPO membrane.



#### WEATHERING PACKAGE CHEMICAL ANALYSIS



\*Competitor D is a premium-priced product compared to the other 4 samples.