

# WeatherBond TPO

## Fleece Membrane



### Overview

WeatherBond TPO Fleece membranes are manufactured using a hot-melt extrusion process for complete scrim encapsulation. Once the WeatherBond TPO is reinforced and enhanced with fleece, the total sheet thicknesses available are 100-, 115-, and 135-mils creating a very tough, durable, and versatile sheet that is ideal for re-roofing or new construction projects. TPO sheets are chlorine free and plasticizer free with excellent chemical resistance to acids, bases, restaurant oils, and greases.

All WeatherBond TPO Fleece membranes utilize OctaGuard XT weathering package technology to withstand extreme durability testing intended to simulate exposure to severe climates. WeatherBond TPO Fleece's advanced polymerization technology combines the flexibility of ethylene-propylene (EP) rubber with the heat weldability of polypropylene.

WeatherBond TPO Fleece membranes are intended to be used with adhered or mechanically attached roofing systems. WeatherBond TPO Fleece is ideally suited for roof garden, solar panel applications, and projects demanding superior wind uplift resistance due to its added toughness and durability. WeatherBond TPO Fleece is also a great solution for buildings requiring low noise and odors during roofing application.

### Features and Benefits

- Choice of white, gray, or tan membranes that are UL Class A rated (Five special colors are available: medium bronze, patina green, rock brown, terra cotta, and slate gray)
- Superior wind uplift performance and ratings (up to an FM 1-990) due to a mechanical bond between fleece and adhesive
- 75% fewer seams than Modified Bitumen
- Wide window of weldability



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- Fleece reinforcement adds toughness, durability and enhanced puncture resistance
  - 115-mil membrane delivers 33% greater puncture resistance and 33% greater breaking strength than 60-mil TPO
  - Greater puncture resistance than Modified Bitumen
- Excellent hail damage resistance
  - Passes FM's severe hail test
  - Passes UL-2218 Class 4 rating
  - Passes National Bureau of Standards – 23 Ice Ball test up to 3"-diameter hail with the membrane cooled to 32°F
- APEEL™ Protective Film application guards the TPO membrane's surface from scuffs and dirt accumulation during installation, improving the roof system's appearance and long-term performance
- APEEL Protective Film can be left in place for up to 90 days without degrading due to its excellent heat- and UV-resistance



### Installation

Insulation is mechanically attached or adhered. Spray-apply, splatter, or extrude Flexible DASH™ Adhesive to the substrate and allow foam to “string/body” approximately 1–2 minutes prior to setting the membrane into the adhesive. Roll the WeatherBond TPO Fleece membrane with a 30"-wide 150-pound weighted roller to ensure full embedment. Splices are hot-air welded. End laps are butted and sealed with reinforced membrane or a head sheet may be utilized.

REVIEW CURRENT WEATHERBOND INSTALLATION INSTRUCTIONS FOR SPECIFIC INSTALLATION REQUIREMENTS.

### Precautions

1. Use proper stacking procedures to ensure sufficient stability.
2. Exercise caution when walking on wet membrane.
3. UV-resistant sunglasses are required for TPO membranes.
4. White surfaces reflect heat and may become slippery due to frost and ice accumulation.
5. Care must be exercised when working close to a roof edge when the surrounding area is snow covered.
6. WeatherBond TPO Fleece membrane rolls must be tarped and elevated to keep dry prior to installation. If the fleece gets wet, use a wet vac system to help remove moisture from the fleece. **DO NOT INSTALL MEMBRANE IF FLEECE IS WET.**
7. WeatherBond TPO Fleece membrane exposed to the weather must be prepared with Weathered Membrane Cleaner prior to hot-air welding.

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## Supplemental Approvals, Statements and Characteristics:

1. Fleece TPO meets or exceeds the requirements of ASTM D6878 Standard Specification for Thermoplastic Polyolefin-Based Sheet Roofing
2. Radiative Properties for Cool Roof Rating Council (CRRC) and LEED.
3. Fleece TPO membranes conform to requirements of the US E.P.A. Toxic Leachate Test (40 CFR part 136) performed by an independent analytical laboratory
4. Fleece TPO was tested for dynamic puncture resistance per ASTM D5635-04 using the most recently modified impact head. 100-mil was watertight after an impact energy of 20 joules, 115-mil was watertight after 25 joules and 135-mil was watertight after 32.5 joules.
5. NSF-P151 Certification for rainwater catchment system components.
  - Plant 91/White Only

## LEED® Information

Pre-consumer Recycled Content	10%
Post-consumer Recycled Content	0%
Manufacturing Locations	Tooele, UT; Senatobia, MS
Solar Reflectance Index (SRI)	White: 99, Gray: 53, Tan: 86

## Radiative Properties for Cool Roof Rating Council (CRRC) & LEED®

Physical Property	Test Method	White	Gray	Tan
CRRC – Initial solar reflectance	ASTM C1549	0.79	0.46	0.71
CRRC – Solar reflectance after 3 years	ASTM C1549 (uncleaned)	0.70	0.43	0.64
CRRC – Initial thermal emittance	ASTM C1371	0.90	0.89	0.86
CRRC – Initial thermal emittance after 3 years	ASTM C1371 (uncleaned)	0.86	0.88	0.87
LEED – Thermal emittance	C1371	0.90	0.85	0.86
Solar Reflectance Index (SRI)	ASTM E1980	99	53	86
Solar Reflectance Index (SRI) - Aged 3 Years	ASTM E 1980	85	48	77

## Extreme Testing – Heat Aging

	ASTM Requirement	WeatherBond TPO Results
ASTM Test 240°F	32 weeks	>128 weeks

*\*Comparable to 3,120 weeks (60 years) at 185°F for 8 hrs/day.*

Heat Aging accelerates the oxidation rate that roughly doubles for each 10°C (18°F) increase in roof membrane temperature. Oxidation (reaction with oxygen) is one of the primary chemical degradation mechanisms of roofing materials.

## Extreme Testing – Environmental Cycling

- 10 days heat aging at 240°F (116°C) followed by 5 days water immersion at 158°F (70°C)
- Followed by 5,040 kJ/m<sup>2</sup> (2,000 hrs. at 0.70 W/m<sup>2</sup> irradiance) xenon-arc exposure

Environmental Cycling subjects the membrane to repeated cycles of heat aging, hot-water immersion or acid fog followed by xenon-arc exposure.



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## EXTREME Testing for Severe Climates

ASTM Standard D6878 is the material specification for Thermoplastic Polyolefin-Based Sheet Roofing. It covers material property requirements for TPO roof sheeting and includes initial and aged properties after heat and xenon-arc exposure. As stated in the scope of the standard, “the tests and property limits used to characterize the sheet are values intended to ensure minimum quality for the intended purpose.” WeatherBond’s goal is to produce TPO that delivers maximum performance for the intended purpose of roofing membranes. Maximum performance requires the membrane to far exceed the requirements of ASTM D6878.

Heat Aging accelerates the oxidation rate that roughly doubles for each 18°F (10°C) increase in roof membrane temperature. Oxidation (reaction with oxygen) is one of the primary chemical degradation mechanisms of roofing materials.

Q-Trac testing combines accelerated weathering with real-world conditions using an array of ten mirrors to reflect and concentrate full spectrum sunlight onto membrane test specimens. The Q-Trac device automatically tracks the sun’s path from morning to night. Also, it adjusts to compensate for seasonal changes in the sun’s altitude. Eight years in Q-Trac testing is equal to 40 years of real-world exposure. WeatherBond requires its TPO membranes to pass the equivalent of 40 years of exposure in the Q-Trac.

## WeatherBond Testing – Q-Trac

	ASTM D6878 Requirement	WeatherBond TPO Requirement
ASTM TEST N/A	N/A	Equivalent of 40 years of exposure

## Radiative Properties (Initial) for Special Colors

	Reflectance	Emittance	SRI
Medium Bronze	0.28	0.86	29
Rock Brown	0.25	0.87	26
Slate Gray	0.38	0.87	42
Terra Cotta	0.25	0.86	25
Patina Green	0.25	0.88	25

Solar Reflectance Index (SRI) is calculated per ASTM E1980. The SRI is a measure of the roof’s ability to reject solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. Materials with the highest SRI values are the coolest choices for roofing. Due to the way SRI is defined, particularly hot materials can even take slightly negative values and particularly cool materials can even exceed 100.

## TPO Membranes

Physical Property	Test Method	SPEC. (Pass)	TPO
Tolerance on Nominal Thickness, %	ASTM D751	+/-10	+/-10
Thickness over Fleece, min			
100-mil (2.54 mm)			.045 (1.14)
115-mil (2.92 mm)			.060 (1.52)
135-mil (3.43 mm)			.080 (2.03)
Weight, lbm/ft <sup>2</sup>			
100-mil	—	—	0.27
115-mil	—	—	0.33
135-mil	—	—	0.46
Breaking Strength, min, lbf (kN)	ASTM D751		
100-mil	Grab Method	220 (1)	375 (1.7)
115-mil			450 (2)
135-mil			500 (2.2)
Elongation at break of internal fabric, %	ASTM D751	15	25
Tearing Strength, min, lbf (N)	ASTM D751		
100- & 115-mil, 135-mil	B Tongue Tear	55 (245)	100 (445)
Puncture Resistance, Joules	ASTM D5635		
100-mil		—	20
115-mil		—	25
135-mil		—	32.5
Puncture Resistance, lbf	FTM 101C		
100-mil	Method 2031	350	450
115-mil		400	525
135-mil		425	600
Brittleness point, max, °F (°C)	ASTM D2137	-40 (-40)	-50 (-46)
Linear Dimensional Change, %	ASTM D1204	± 1 max	-0.2 typical
Field Seam Strength, lbf/in. (kN/m)	ASTM D1876		
ASTM D1876 tested in peel			
100-mil		25 (4.4)	50 (8.8)
115-mil		25 (4.4)	60 (10.5)
135-mil		40 (7.0)	70 (12.3)
Water Vapor Permeance, perms	ASTM E96	—	0.10 max
	Proc B		0.05 typical
Resistance to Microbial Surface Growth, Rating (1 is very poor, 10 is no growth)	ASTM D3274	—	9-10 typical
Properties after heat aging –ASTM D573, 670 hrs at 240°F	ASTM D573		
Breaking strength, % retained		—	90 min
Elongation reinf. % retained		—	90 min
Tearing Strength, % retained		—	60 min
Weight Change, %		—	± 1.0 max
Ozone Resistance 100 pphm, 168 hours	ASTM D1149	No cracks	No cracks
Resistance to Water Absorption	ASTM D471	±3.0	0.90
After 7 days immersion @ 158°F (70°C)			
Change in mass, max, %			
Resistance to Outdoor (Ultraviolet) Weathering Xenon-Arc, total radiant exposure at 0.70 W/m <sup>2</sup> irradiance, 80°C black panel temp.	ASTM G155	No cracks No loss of breaking or tearing strength	No cracks No loss of breaking or tearing strength
100-mil			17,640 kJ/m <sup>2</sup>
115-mil			20,160 kJ/m <sup>2</sup>
135-mil			27,720 kJ/m <sup>2</sup>

Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification range for any particular property of this product



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