

WeatherBond TPO

Fleece Membrane



Overview

WeatherBond's Fleece TPO membranes are manufactured using a hot-melt extrusion process for complete scrim encapsulation. Once the 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. Fleece TPO sheets are chlorine free and plasticizer free with excellent chemical resistance to acids, bases, restaurant oils, and greases.

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

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

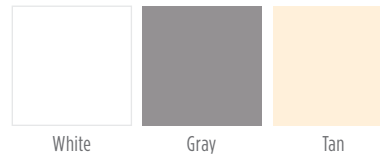
Features and Benefits

- No VOCs, low odor, low noise, and speed of application minimizes occupied building disruptions
- 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
- Fleece reinforcement adds toughness, durability, and enhanced puncture resistance



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- 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
- Standard Colors:



- Special Colors:



*WeatherBond HS Special Color TPO membranes are available in limited sizes. Refer to WeatherBond's HS TPO Special Color Program Sell Sheet for details.

Sustainable Attributes

WeatherBond Roofing Systems' focus has always been innovation – Innovation to solve problems, improve performance, reduce labor, and above all, improve sustainability. WeatherBond is committed to driving sustainable and efficient processes in the design and manufacturing of our products.

- Up to 10% pre-consumer recycled content
- Free of Living Building Challenge red list chemicals
- NSF P151 Certification for rainwater catchment*
- 3rd-party verified Environmental Product Declaration available

*Plant 91/White only

Optional APEEL™ Protective Film

Shield WeatherBond's Fleece TPO membrane from dirt and scuffs during installation with APEEL Protective Film. Factory-applied and easy to remove, APEEL eliminates the need for rooftop cleaning upon project completion.



- Ideal for re-roofing, re-cover, and new construction projects
- Simple and easy to remove
- Saves time and money when compared to pressure washing
- Protecting from dirt maintains maximum membrane reflectivity and long-term performance

Installation

Simply order membrane with APEEL, install, and remove the film to reveal a clean, new roof.

- APEEL Protective Film should be removed from within areas that are to be heat-welded together. In areas that do not require heat-welding, the APEEL Protective Film can be left in place for up to 90 days without degrading due to its excellent heat- and UV-resistance .
- When the installation of the entire roofing system is complete, remove and discard the APEEL Protective Film.

Installation

Adhered Roofing System

Insulation is mechanically fastened or adhered. Spray-apply, splatter, or extrude Flexible DASH™ Adhesive to the substrate and allow foam to “string/body” approx 1 – 2 minutes prior to setting Fleece TPO into the Flexible DASH Adhesive. Roll Fleece TPO 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 SPECIFICATIONS AND DETAILS FOR SPECIFIC INSTALLATION REQUIREMENTS.

Precautions

1. Use proper stacking procedures to ensure sufficient stability.
2. Exercise caution when walking on wet membrane.
3. Sunglasses that filter out ultraviolet light are strongly recommended, as tan and white surfaces are highly reflective. Roofing technicians should dress appropriately and wear sunscreen.
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. Fleece TPO 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. Fleece TPO membrane exposed to the weather must be prepared with Weathered Membrane Cleaner prior to hot-air welding.

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.

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: 52, Tan: 86

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

Physical Property	Test Method	White	Tan	Gray
CRRC – Initial solar reflectance	ASTM C1549	0.79	0.71	0.46
CRRC – Solar reflectance after 3 years	ASTM C1549 (uncleaned)	0.70	0.64	0.43
CRRC – Initial thermal emittance	ASTM C1371	0.90	0.86	0.89
CRRC – Initial thermal emittance after 3 years	ASTM C1371 (uncleaned)	0.86	0.87	0.88
LEED – Thermal emittance	C1371	0.90	0.86	0.85
Solar Reflectance Index (SRI)	ASTM E1980	99	86	52
Solar Reflectance Index (SRI) - Aged 3 Years	ASTM E 1980	85	77	49

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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Single-Ply Simplified

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/m² (2,000 hrs. at 0.70 W/m² 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.

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	0.12	0.89	8
Rock Brown	0.23	0.88	23
Slate Gray	0.20	0.89	18
Terra Cotta	0.25	0.88	24
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.

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.



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TPO Membranes

Physical Property	Test Method	SPEC. (Pass)	Fleece TPO
Tolerance on Nominal Thickness, %	ASTM D751	+/-10	+/-10
Thickness over Fleece, min 100-mil (2.54 mm) 115-mil (2.92 mm) 135-mil (3.43 mm)			.045 (1.14) .060 (1.52) .080 (2.03)
Weight, lbm/ft ² 100-mil 115-mil 135-mil	— — —	— — —	0.27 0.33 0.46
Air Permeance	ASTM E2178	(0.02 L/s*m ²)	Pass
Breaking Strength, min, lbf (kN) 100-mil 115-mil 135-mil	ASTM D751 Grab Method	220 (1)	375 (1.7) 450 (2) 500 (2.2)
Elongation at break of internal fabric, %	ASTM D751	15	25
Tearing Strength, min, lbf (N) 100- & 115-mil, 135-mil	ASTM D751 B Tongue Tear	55 (245)	100 (445)
Puncture Resistance, Joules 100-mil 115-mil 135-mil	ASTM D5635	— — —	20 25 32.5
Puncture Resistance, lbf 100-mil 115-mil 135-mil	FTM 101C Method 2031	350 400 425	450 525 600
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 tested in peel 100-mil 115-mil 135-mil	ASTM D1876	25 (4.4) 25 (4.4) 40 (7.0)	50 (8.8) 60 (10.5) 70 (12.3)
Water Vapor Permeance, perms	ASTM E96 Proc B	—	0.10 max 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 Breaking strength, % retained Elongation reinf. % retained Tearing Strength, % retained Weight Change, %	ASTM D573	— — — —	90 min 90 min 60 min ± 1.0 max
Ozone Resistance 100 pphm, 168 hours	ASTM D1149	No cracks	No cracks
Resistance to Water Absorption After 7 days immersion @ 158°F (70°C) Change in mass, max, %	ASTM D471	±3.0	0.90
Resistance to Outdoor (Ultraviolet) Weathering Xenon-Arc, total radiant exposure at 0.70 W/m ² irradiance, 80°C black panel temp. 100-mil 115-mil 135-mil	ASTM G155	No cracks No loss of breaking or tearing strength	No cracks No loss of breaking or tearing strength 17,640 kJ/m ² 20,160 kJ/m ² 27,720 kJ/m ²

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