

# FleeceBACK® RL™ TPO

## RapidLock Membrane



### Overview

Carlisle's RapidLock (RL) Roofing System is a revolutionary method of membrane attachment resulting in an adhered membrane without the use of adhesives. This innovative system utilizes VELCRO® Brand Securable Solutions along with FleeceBACK RL TPO to achieve performance equal to traditional adhered single-ply systems. Underlayment options include 2.0" InsulBase® RL or SecurShield® HD RL Polyiso resulting in a VOC- and odor-free attachment method having no temperature restrictions. Significant labor savings are achieved due to the simplicity of the system and ease of installation.

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

### Productivity Boosting Features and Benefits:

- » Up to 80% rooftop labor savings over traditional bonding adhesives
- » Eliminates rolling and flash-off times
- » Up to 25% rooftop labor savings over low-rise urethanes
- » Eliminates equipment and string-time
- » Reduces jobsite cleanup by eliminating buckets and drums



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

### Features and Benefits

- » No temperature restrictions - See reverse side for precautions and limitations
- » Adhesive-less system saves time and labor
- » 67% fewer seams than Modified Bitumen
- » FleeceBACK RL TPO membranes are UL Class A rated
- » Wide window of weldability
- » 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
- » Wind uplift ratings comparable to traditional fully-adhered single-ply systems
- » Excellent hail damage resistance
- » No VOC's
- » No odor
- » Maximum 20-year warranty

### Installation

#### RapidLock Roofing System

Insulation Attachment (Mechanically Fastened) – RapidLock insulation is mechanically fastened to the roof deck per Carlisle's specification.

Insulation Attachment (Adhered) – RapidLock insulation is adhered with Flexible FAST™ Adhesive to the roof deck. When adhering insulation with Flexible FAST, the adhesive is spray-applied or extruded onto the substrate and allowed to rise and foam. Once the adhesive develops string/body/gel (approximately 1–2 minutes depending on climate), place insulation into the adhesive and walk board into place. Roll the insulation with 150-pound segmented weighted roller to ensure full embedment.

When the completion of flashings and terminations is not possible by the end of each work day, provisions must be taken to temporarily close the membrane to prevent water infiltration.

Membrane Attachment – Prior to membrane placement, the surface of the RapidLock insulation must be cleaned of dust and other foreign matter using a fine push broom or a blower.

# FleeceBACK RL TPO

## RapidLock Membrane

### Option 1

1. Remove the RapidLock fleece release film on one half of the sheet starting from the split in the liner at the middle of the sheet. The liner should be removed at an angle to reduce splitting or tearing.
2. Roll the membrane onto the substrate at an angle while avoiding wrinkles. When applying Carlisle's FleeceBACK RL TPO membrane, it is recommended to maintain a large curve (radius) on the leading edge of the membrane. This will help eliminate creases and bubbles that cannot be removed after the sheet is in place.
3. Broom the sheet and then roll the membrane in place starting using a 150-lb roller from the middle of the 10'- wide sheet and working towards the outer edge.
4. Fold back the remaining half of the sheet and repeat the above process.

### Option 2

1. Pull both release liners off simultaneously from underneath the membrane at a low angle.
2. Broom the sheet and then roll the membrane in place starting using a 150-lb roller from the middle of the 10'- wide sheet and working towards the outer edge.

### Heat-Welding Procedures

1. Refer to the TPO Adhered Application specification for typical heat welding procedures.
2. The membrane has an uncoated edge on one side along the length of the sheet for membrane welding. Adjoining membrane sheets are overlapped lengthwise a minimum of 2" to provide for a minimum 1½"-wide heat weld. It is recommended that all splices be shingled to avoid bucking of water.
3. An uncoated edge is not provided at the ends of the rolls. Adjoining membrane sheets must be butted together and overlaid with 6"- wide TPO Reinforced Membrane, hot-air welded along all edges. Seal all membrane edges (where scrim reinforcement is exposed) with TPO Cut-Edge Sealant.

Review Carlisle specifications and details for complete installation information

### Precautions

- » Use proper stacking procedures to ensure sufficient stability.
- » Exercise caution when walking on wet membrane.
- » UV-resistant sunglasses are required when working with FleeceBACK RL TPO membranes.
- » White surfaces reflect heat and may become slippery due to frost and ice accumulation.

- » Care must be exercised when working close to a roof edge when the surrounding area is snow covered.
- » FleeceBACK RL 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.**
- » FleeceBACK RL TPO membrane exposed to the weather must be prepared with Weathered Membrane Cleaner prior to hot-air welding.
- » RapidLock fleece and insulation engagement is permanent once paired. Do not rapidly pull RapidLock fleece from the insulation once engaged.
- » **RapidLock fleece cannot be used with 2-part urethane adhesives (Flexible FAST, OlyBond).**
- » RapidLock release film is recyclable but restricted to local regulations. For recycling information, check with your local municipality.

### LEED® Information

Pre-consumer Recycled Content	10%
Post-consumer Recycled Content	0%
Manufacturing Location	Senatobia, MS
Solar Reflectance Index	White: 99, Gray: 53

### Radiative Properties for ENERGY STAR®\*, Cool Roof Rating Council (CRR) and LEED

Physical Property	Test Method	White	Gray
ENERGY STAR – Initial solar reflectance	Solar Spectrum Reflectometer	0.79	N/A
ENERGY STAR – Solar reflectance after 3 years	Solar Spectrum Reflectometer (uncleaned)	0.70	N/A
CRR – Initial solar reflectance	ASTM C1549	0.79	0.46
CRR – Solar reflectance after 3 years	ASTM C1549 (uncleaned)	0.70	0.43
CRR – Initial thermal emittance	ASTM C1371	0.90	0.89
CRR – Thermal emittance after 3 years	ASTM C1371 (uncleaned)	0.86	0.88
LEED – Thermal emittance	C1371	0.90	0.85
Solar Reflectance Index (SRI) – Initial	ASTM E1980	99	53
Solar Reflectance Index (SRI) – Aged 3 Years	ASTME E1980	85	48

## 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.” Carlisle’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.

Carlisle Testing – Heat Aging		
	ASTM Requirement	Sure-Weld Requirement
ASTM TEST 240°F	32 weeks**	>128 weeks

\*\*Heat exposure comparable to 3,120 weeks (60 years) at 185°F for 8 hours/day.

- » Test specimen is a 2” by 6” piece of 45-mil membrane unbacked, placed in circulating hot-air oven.
- » Criterion – no visible cracks after bending aged test specimen around 3”-diameter mandrel.

**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. Carlisle requires its Sure-Weld TPO membranes to pass the equivalent of 40 years of exposure in the Q-Trac.

Carlisle Testing – Q-Trac		
	ASTM D6878 Requirement	Sure-Weld Requirement
ASTM TEST N/A	N/A	Equivalent of 40 years of exposure

**Environmental Cycling** subjects the membrane to repeated cycles of heat aging, hot-water immersion, and xenon-arc exposure.

- » ASTM requirement – none
- » Carlisle EXTREME test\*:
  - 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> (2000 hours at 0.70 W/m<sup>2</sup> irradiance) xenon-arc exposure

\*Test specimen is 2.75" by 5.5" piece of membrane with edges sealed.

\*Criterion – after 3 complete cycles, test specimens shall remain flexible and not have any cracking under 10x magnification while wrapped around a 3"-diameter mandrel.

# FleeceBACK RL TPO

## RapidLock Membrane

### Typical Properties and Characteristics

Physical Property	Test Method	SPEC. (Min.)	FleeceBACK TPO Typical
Tolerance on Nominal Thickness, %	ASTM D751	±10	±10
Thickness over Fleece, min 115-mil (2.92 mm)	—	—	.060 (1.52)
Weight, lbm/ft <sup>2</sup> 115-mil	—	—	0.33
Breaking Strength, min, lbf (kN) 115-mil	ASTM D751 Grab Method	220 (1)	450 (2)
Elongation at break of internal fabric, %	ASTM D751	15	25
Tearing Strength, min, lbf (N) 115-mil	ASTM D751 B Tongue Tear	55 (245)	100 (445)
Puncture Resistance, Joules 115-mil	ASTM D5635	—	22.5
Puncture Resistance, lbf 115-mil	FTM 101C Method 2031	400	500
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 115-mil	ASTM D1876	25 (4.4)	60 (10.5)
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, 32 weeks at 240 °F	ASTM D573	—	± 1.0 max
Weight Change, %			
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, % (one side)	ASTM D471	± 3.0	0.90
Resistance to Outdoor (Ultraviolet) Weathering Xenon-Arc, total radiant exposure (20,160 Kj/m <sup>2</sup> ) at 0.70 W/m <sup>2</sup> irradiance, 80°C black panel temp. 115-mil	ASTM G155	No cracks No loss of breaking or tearing strength	No cracks No loss of breaking or tearing strength 20,160 kj/m <sup>2</sup>

### Supplemental Approvals, Statements and Characteristics:

1. RapidLock TPO meets or exceeds the requirements of ASTM D6879 Standard Specification for Thermoplastic Polyolefin-Based Sheet Roofing.
2. Radiative Properties for ENERGYSTAR, CoolRoofRating Council (CRRC) and LEED.
3. RapidLock 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. RapidLock TPO was tested for dynamic puncture resistance per ASTM D5635-04 using the most recently modified impact head. 45-mil was watertight after an impact energy of 12.5J (9.2 ft-lbf) and 60-mil was watertight after 22.5 J (16.6 ft-lbf). 80-mil EXTRA was watertight after an impact energy of 30.0 J (22.1 ft-lbf).

