



Thermoplastic Single Ply and Multi-Ply Roofing Systems

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FLEX SELF-ADHERING REINFORCED TPO MEMBRANE

GENERAL:

Flex Self Adhering TPO Membrane (SAM) is a heat-weldable single-ply thermoplastic polyolefin (TPO) sheet designed for fully adhered new roof construction and re-roofing applications. Flex (SAM) is nominal 45-mil or 60-mil reinforced TPO membrane laminated to an elastomeric pressure-sensitive adhesive. Flex (SAM) is based on advanced polymerization technology that combines the durability and weatherability of ethylene-propylene (EP) rubber with the heat weldability of polypropylene. The membrane is specifically formulated for long-term weather resistance without the use of either polymeric or liquid plasticizers.

The pressure-sensitive adhesive is a 100% solids, hot melt adhesive that eliminates VOC and odor concerns typically associated with fully adhered systems. The adhesive is factory applied to provide uniform thickness yielding consistent field performance. An uncoated edge is maintained to allow for heat welded field seams. The release liner is silicon coated on both sides to provide consistent, easy release from the adhesive even if either side accidentally touches the adhesive again after removal.

Flex (SAM) is available in white (highly reflective) 45-mil and 60-mil nominal thicknesses. Available widths are 5 and 10 ft in 50 and 100 ft rolls. The membrane is environmentally friendly and safe to install with its VOC free pressure sensitive adhesive and heat welded seams.

Flex (SAM) white TPO membranes are LEED™ (Leadership in Energy and Environmental Design) compliant. The U.S. Green Building Council (USGBC) designed the LEED Green Building Rating System. White Flex (SAM) is an ENERGY STAR® and California Title 24 rated roof product.

FEATURES:

- High tack, pressure sensitive adhesive
- Wide window of weldability
- Outstanding puncture resistance
- Chlorine-free with no halogenated flame retardants
- Plasticizer-free, does not contain liquid or polymeric plasticizers
- Excellent low temperature impact resistance
- Excellent chemical resistance to acids, bases, and restaurant exhaust emissions
- Exceptional resistance to solar UV, ozone, and oxidation
- Low water vapor permeance and water absorption
- Hot melt extrusion processed for complete scrim encapsulation
- Warp knitted fabric (not woven) for smooth surface and greater thickness-over-scrim
- Polyester reinforcing fabric which is resistant to degradation by bacteria, mildew and fungi
- Consistent color

TYPICAL PROPERTIES AND CHARACTERISTICS:

See table that is attached for basic properties and supplemental section on page 4. Typical weights are 0.31 lb/ft² (1.5 kg/m²) for 45-mil and 0.39 lb/ft² (1.9 kg/m²) for 60-mil membrane.

CAUTIONS AND WARNINGS:

- **A static electric charge may develop when removing the poly release liner from the elastomeric pressure sensitive adhesive on the back of the membrane sheet. To avoid the possibility of ignition, lids must be closed on any flammable solvent-based adhesives and a fire extinguisher should be readily available.**
- Sunglasses which filter out ultraviolet light are strongly recommended since tan and white surfaces are highly reflective to sunlight. Roofing technicians should dress appropriately and wear sunscreen to protect skin from the sun.
- Surfaces may promote slippery conditions due to frost and ice build-up. Exercise caution during cold conditions to prevent falls.
- Care must be exercised when working close to a roof edge when surrounding area is snow covered as the roof edge may not be clearly visible.
- Use proper stacking procedures to ensure sufficient stability of the rolls.
- Exercise caution when walking on wet membrane. Membranes may be slippery when wet.
- Store Flex (SAM) in the original undisturbed plastic wrap in a cool, shaded area and cover with light colored, breathable, waterproof tarpaulins. Flex (SAM) that has been exposed to the weather for approximately 7 days or longer must be prepared with Weathered Membrane Cleaner prior to hot air welding.

INSTALLATION REQUIREMENTS:

Flex Roofing Systems are fast to install since minimal labor and few components are required. The systems may be installed utilizing labor-saving devices that make sheet welding fast, clean, consistent, and easy to learn, while reducing strain on the roofing technician.

The Flex Pressure Sensitive Fully-Adhered Roofing System application begins with the insulation / underlayment being attached per the required attachment specification.

1. The Flex Roofing Systems (SAM) TPO Membrane may only be installed when the outdoor temperature is 50° F or rising.
2. The surface to which the membrane is to be applied must be very clean. Prior to membrane placement, the surface of the insulation or underlayment board must be cleaned of dust and other foreign matter using a fine push broom or a blower.

INSTALLATION PROCEDURES:

Note: Priming of the insulation surface is not required; however, walls and vertical surfaces must be primed with HP-250 Primer prior to installing the (SAM) TPO membrane.

1. Remove the release liner 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 of the liner.

Caution: A static electrical charge may develop when removing the release liner from the adhesive on the back of the membrane sheet. To avoid the possibility of ignition, lids must be closed on any solvent-based adhesives and a fire extinguisher should be readily available.

2. Roll the membrane onto the substrate while avoiding wrinkles. To achieve the best adhesion, the membrane should be rolled onto the substrate at an angle. When applying the Flex (SAM) 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. Roll the Flex (SAM) TPO Membrane with a segmented roller to ensure full contact with the substrate.
4. Fold back the remaining half of the sheet and repeat the above process.

HEAT WELDING PROCEDURES:

1. Refer to the Flex 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 in. to provide for a minimum 1-1/2 in. 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 in. wide Flex Reinforced Membrane, hot air welded along all edges. Seal all membrane edges (where scrim reinforcement is exposed) with Cut-Edge Sealant.

WALL FLASHING:

1. Walls may be flashed using standard TPO membrane with Flex Bonding Adhesive or with (SAM) TPO (primer must be utilized on all vertical surfaces).

Contact your Flex Representative for the specific design requirements and installation procedures for this system.

FLEX (SAM) 45 & 60-MIL THICK REINFORCED TPO SHEET

BASIC PROPERTIES AND CHARACTERISTICS			
Physical Property	Test Method	Property Of Unaged Sheet	Property After ASTM D573 aging₁ 28 days @ 240 °F
Nominal thickness with adhesive, in. (mm) 45-mil (adhesive nominal thickness is 0.010) 60-mil (adhesive nominal thickness is 0.010)	ASTM D751		0.055 (1.40) 0.070 (1.78)
Thickness over scrim, in. (mm) 45-mil 60-mil	ASTM D6878 Optical Method (avg. of 3 areas)		typical 0.018 (0.457) ± 10% 0.024 (0.610) ± 10%
Breaking strength, lbf (kN)	ASTM D751 Grab Method	225 (1.0) min. 45-mil 320 (1.4) typical 45-mil 250 (1.1) min. 60-mil 360 (1.6) typical 60-mil	225 (1.0) min. 45-mil 320 (1.4) typical 45-mil 250 (1.1) min. 60-mil 360 (1.6) typical 60-mil
Elongation at break of fabric, %	ASTM D751	25 typical	25 typical
Tearing strength, lbf (N) 8 by 8 in. specimen	ASTM D751 B Tongue Tear	55 (245) min. 130 (578) typical	55 (245) min. 130 (578) typical

Brittleness point, °F (°C)	ASTM D2137	- 40 (- 40) max. - 50 (- 46) typical
Linear Dimensional Change (shrinkage), % After 6 hours at 158 oF (70 oC)	ASTM D1204	+/- 0.5 max. - 0.2 typical
Ozone resistance, 100 pphm, 168 hours	ASTM D1149	No cracks
Resistance to water absorption After 7 days immersion 158 °F (70 °C) Change in mass, %	ASTM D471 (top surface only)	4.0 max. 2.0 typical
Resistance to microbial surface growth, rating (1 is very poor, 10 is no growth)	ASTM D3274 2 yr S. Florida	9-10 typical
Field seam strength, lbf/in. (kN/m) Seam tested in peel	ASTM D1876	25 (4.4) min. 60 (10.5) typical
Water vapor permeance, Perms	ASTM E96	0.10 max. 0.05 typical
Puncture resistance, lbf (kN) (see supplemental section for additional puncture data)	FTM 101C Method 2031	250 (1.1) min. 45-mil 325 (1.4) typical 45-mil 300 (1.3) min. 60-mil 350 (1.6) typical 60-mil
Resistance to xenon-arc weathering 2 Xenon-Arc, 17,640 kJ/m ² total radiant exposure, visual condition at 10X	ASTM G155 0.70 W/m ² 80 °C B.P.T.	No cracks No loss of breaking or tearing strength
¹ Aging conditions are 28 days at 240 °F (116 °C) equivalent to 400 days at 176 °F (80 °C) for breaking strength, elongation, tearing strength, ozone and puncture resistance ² Approximately equivalent to 14,000 hours exposure at 0.35 W/m ² irradiance B.P.T. is black panel temperature 6/07		

SUPPLEMENTAL APPROVALS, STATEMENTS AND CHARACTERISTICS:

1. Flex TPO meets or exceeds the requirements of **ASTM D6878₁** Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing.
2. **Radiative Properties** for ENERGY STAR®, Cool Roof Rating Council (CRRC) and LEED™

TEST METHOD	WHITE TPO	
ENERGY STAR initial solar reflectance	Solar Spectrum Reflectometer	0.87
ENERGY STAR solar reflectance after 3 years	Solar Spectrum Reflectometer (after cleaning)	0.83
CRRC initial solar reflectance	ASTM C1549	0.79
CRRC solar reflectance after 3 years	ASTM C1549 (uncleaned)	0.70
CRRC initial thermal emittance	ASTM C1371	0.90
CRRC thermal emittance after 3 years	ASTM C1371 (uncleaned)	0.86
LEED thermal emittance	ASTM E408	0.95
SRI (Solar Reflectance Index)	ASTM E1980	110

An ENERGY STAR compliant low slope roof product must have an initial solar reflectance of at least 0.65 and a 3 year aged solar reflectance of at least 0.50. Cleaning of the aged roof surface is permitted by the ENERGY STAR test protocol.

The Cool Roof Rating Council (CRRC) does not specify minimums for reflectance or emittance but they do require specific protocols for testing and reporting. Cleaning of the aged roof surface is **not** permitted for determination of radiative properties after 3 years.

A LEED “point” may be earned if a roof material is ENERGY STAR qualified **and** has a thermal emittance of at least 0.90 as determined by ASTM E408.

California Title 24 requires an initial minimum reflectance of 0.70 and emittance of 0.75 as determined by CRRC test protocol.

Solar Reflectance Index (SRI) is calculated per ASTM E 1980. 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.

3. Flex TPO membranes conform to requirements of the U.S.E.P.A. **Toxic Leachate Test** (40 CFR part 136) performed by an independent analytical laboratory.
4. Flex reinforced 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 12.5 J (9.2 ft-lbf) and 60-mil was watertight after 22.5 J (16.6 ft-lbf).

For additional information on Flex Products visit our website at www.flexroofingsystems.com

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