



PRODUCTS FOR OUR ENVIRONMENT

TECHNICAL DATA SHEET

ERS-TPO FB Membrane

For Professional Use Only



PRODUCT DESCRIPTION:

ERS-TPO FB Membrane is polyester reinforced, .045" or .060 thick, polyolefin based, thermoplastic, heat-weldable membranes with a polyester fleece backing. They are used in fully adhered and mechanically attached roofing assemblies. These may also be used as flexible membrane flashings for walls, curbs, etc, when installing TPO-c Fleece Back membrane roofing systems.

RECOMMENDED USES:

ERS-TPO FB Membrane is used in fully adhered and mechanically attached roofing systems in new construction, reroofing and recover (retrofit) applications. The system must be installed over an acceptable roof insulation or other suitable substrate. See Ecology Roof Systems TPO Fleece Back Specifications Manual for complete specifications and details.

ADVANTAGES:

- Wide window of weldability
- Outstanding puncture resistance which is enhanced further by the fleece backing
- Chlorine-free with no halogenated flame retardants
- Excellent low temperature impact resistance
- Excellent chemical resistance to acids, bases, restaurant oils and greases
- Plasticizer-free, does not contain liquid or polymeric plasticizer
- Exceptional resistance to solar UV, ozone and oxidation
- Hot melt extrusion processed for complete scrim encapsulation
- Warp knitted fabric (not woven) for smooth surface and greater thickness-over-scrim
- Low vapor permeance and water absorption
- Polyester reinforcing fabric and fleece backing which are resistant to degradation by bacteria, mildew and fungi
- Polyester fleece backing for fully adhered systems provided exceptional wind uplift resistance
- ERS-TPO FB Membrane is 100% recyclable

APPROVALS:

A variety of Factory Mutual Ratings and Underwriters Laboratories Classifications are available. Contact Ecology Roof Systems for additional information.



1) The fabric reinforced membrane component of ERS-TPO FB Membrane meets and 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™

| DESCRIPTION | TEST METHOD | WHITE TPO |
|--|------------------------------|-----------|
| ENERGY STAR® initial solar reflectance | Solar Spectrum Reflectometer | 0.79 |
| ENERGY STAR® solar reflectance after 3 years | Solar Spectrum Reflectometer | 0.70 |
| ENERGY STAR® initial emissivity | | 0.90 |
| CRRC initial solar reflectance | ASTM C 1549 | 0.79 |
| CRRC solar reflectance after 3 years | ASTM C 1549 (uncleaned) | 0.70 |
| CRRC initial thermal emittance | ASTM C 1371 | 0.90 |
| CRRC thermal emittance after 3 years | ASTM C 1371 (uncleaned) | 0.86 |
| CRRC SRI (Solar Reflectance Index) | ASTM E 1980 | 99 |
| CRRC SRI (Solar Reflectance Index after 3 yrs) | ASTM E 1980 | 85 |
| CRRC Product ID | N/A | 0670-0009 |
| LEED™ thermal emittance | ASTM E 408 | 0.95 |

3) ERS-TPO FB Membrane is LEED compliant and is a ENERGY STAR® and California Title 24 rated roof product.

An ENERGY STAR qualified 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 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.

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.

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

4) ERS-TPO FB Membrane conforms to requirements of the U.S.E.P.A. Toxic Leachate Test (40 CFR part 136) performed by an independent analytical laboratory.

5) ERS-TPO FB Membrane 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)

INSTALLATION:

Install the EPDM membrane in accordance with the appropriate current printed Ecology Roof Systems specification. Carefully review and follow the installation instructions in the Ecology Roof Systems manual. All flashing details are to be installed in accordance with Ecology Roof Systems current published details.

PHYSICAL PROPERTIES:

| Physical Properties | Test Method | Specification (min.) | Mule-Hide TPO |
|---|---|---|---|
| Tolerance on Nominal Thickness, % | ASTM D 751 | ± -10 | ± -10 |
| Thickness over fleece FB-45 (100 mils total) FB-60 (115 mils total) | ASTM D 4637 | 0.030 inch (.762 mm) 0.045 inch (1.14 mm) | 0.045 inch (1.14 mm) 0.060 inch (1.52 mm) |
| Weight FB-45 (100 mils total) FB-60 (115 mils total) | --- | --- | 0.27 lbf/ft ² 0.34 lbf/ft ² |
| Breaking Strength FB-45 (100 mils total) FB-60 (115 mils total) | ASTM D-751 (Grab Method) | 90 lb (0.4 kN) | 300 lb (1.3 kN) 400 lb (1.8 kN) |
| Elongation at break of internal fabric | ASTM D-751 | --- | 25% typical |
| Tearing Strength, B Tongue Tear | ASTM D-751 | 10 lb (45 kN) | 55 lb (245 kN) |
| Brittleness point | ASTM D-2137 | -40 F° (-40 C°) max. | -40 F° (-40 C°) |
| Linear Dimensional Change | ASTM D-1204 | +/- 1.0% max | -0.2% typical |
| Ozone resistance, 100 pphm, 168 hours | ASTM D-1149 | No cracks | No cracks |
| Resistance to water absorption After 7 days immersion 158°F (70°C) Change in mass, % | ASTM D-471 (fleece removed, edges sealed) | + 4.0% | +2.0% |
| Resistance to microbial surface growth, rating (1 is very poor, 10 is no growth) | ASTM D-3274 | --- | 9-10 typical |
| Field seam strength, seam tested in peel FB-45 (100 mils total) FB-60 (115 mils total) | ASTM D-1876 | 25 lbf/in (4.4 kN/m) 25 lbf/in (4.4 kN/m) | 40 lbf/in (7.4 kN/m) 60 lbf/in (10.5 kN/m) |
| Water vapor permeance, Proc B | ASTM E-96 | --- | 0.10 perms max 0.05 perms typical |
| Puncture resistance FB-45 (100 mils total) FB-60 (115 mils total) | FTM 101C Method 2031 (lbf) ASTM D5635 (Joules) | 350 lbf (--- Joules) 400 lbf (--- Joules) | 450 lbf (17.5 Joules) 500 lb (22.5 Joules) |
| Resistance to Outdoor (UV) Weathering Xenon-Arc, 0.70 W/m ² irradiance exposure FB-45 (100 mils total) FB-60 (115 mils total) | ASTM G155 0.70 W/m ² 80°C B.P.T. | No cracks No loss of breaking or tearing strength | No cracks No loss of breaking or tearing strength 17,640 kg/m ² 20,160 kg/m ² |
| Properties after heat aging Breaking Strength - % retained Elongation Reinforced - % retained Tearing Strength - % retained Weight Change - % | ASTM D573 670 hrs @ 240 °F | --- | 90% min 90% min 60% min ± 1.0% max |

EXTREME TESTING – HEAT AGING

| Test Method | ASTM Requirement | Typical Results |
|---|---------------------|-------------------------|
| ASTM Test - 240° F (116° C), No Visible Cracks | 670 Hours (4 weeks) | 5,376 Hours (32 weeks*) |
| Extreme Test - 275° F (135° C), No Visible Cracks | N/A | 1,322 Hours (8 weeks) |

*Comparable to 1,024 weeks (20 years) at 185° F for 6 hours per 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

| | |
|--|---|
| Extreme Test One cycle consists of 4 series of tests | 10 days heat aging at 240° F (116° C) 5 days of water immersion at 158° F (70° C) or with another specimen set 5 eight-hours cycles in Kesternich sulfur dioxide chamber (sulfurous acid fog) 5040 kJ/m ² (2000 hours @ 0.70 W/ m ² irradiance) xenon-arc exposure |
| Test Criteria | After three complete cycles, test specimens shall remain flexible and not have any cracking under 10X magnification while wrapped around a 3" mandrel. |

Environmental Cycling subjects the membrane to repeated cycles of heat aging, hot-water immersion or acid fog followed xenon-arc exposure. The acid fog accelerates acid etching that may occur from acid rain if the roof membrane is not resistant to acidic conditions.

| XENON-ARC TESTING | | | |
|--|-------------------------------|-------------------------------|-------------------------------|
| | ASTM D6878 Requirement | Typical Results 45-mil | Typical Results 60-mil |
| kJ/ m2 at 340 nm | 10,080 | 17,640 | 20,160 |
| Hours at 0.35 W/m2 | 8,000 | 14,000 | 16,000 |
| Hours at 0.70 W/m2 | 4,000 | 7,000 | 8,000 |
| Total UV in MJ/ m2 (300 to 400 nm) | 1,210 | 2,118 | 2,420 |
| <p>Xenon-Arc exposes the membrane samples to the combined effect of ultraviolet, visible and infrared radiation, ozone, heat and water spray, to greatly accelerate the affects of outdoor weathering. The radiation "dose" is measured in kilojoules per square meter (kJ/ m2) at 340 nm machine UV wavelength. The irradiance "power" of the xenon-arc lamp is measured in Watts per square meter (W/m2). Test specimen is 2.75 by 5.5 in. piece of membrane, unbacked, weathering side facing lamp. Criteria – no visible cracks viewed under 10X magnification while wrapped around a 3 in. mandrel.</p> | | | |

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