

TPO Membrane



Overview

Henry TPO Membrane is a premium, heat-weldable, single-ply thermoplastic polyolefin (TPO) sheet designed for new roof construction and re-roofing applications.

TPO Membrane uses advanced polymerization technology that combines the flexibility of ethylene-propylene (EP) rubber with the heat weldability of polypropylene. TPO Membrane contains an industry-leading, state-of-the-art weathering package. This technology enables TPO Membrane to withstand the extreme weatherability testing that is intended to simulate exposure to severe climates.

Physical properties of TPO Membrane are enhanced by a strong polyester fabric that is encapsulated between the TPO-based top and bottom plies. The combination of the fabric and TPO plies provides high breaking and tearing strength, as well as excellent puncture resistance. The smooth surface texture of TPO Membrane reduces dirt pick-up when exposed to rooftop conditions. TPO Membrane is environmentally friendly and safe to install.

Features and Benefits

- Outstanding puncture resistance
- Environmentally friendly and stable formulation
- Excellent resistance to impact and low temperatures
- Excellent chemical resistance to acids, bases and restaurant exhaust emissions
- Compounded with non-halogenated flame retardants
- Exceptional resistance to heat, solar UV, ozone and oxidation
- Manufactured using a hot-melt extrusion process for complete scrim encapsulation
- Enhanced with industry leading weathering package

Sizes

- 6' x 50' (1.8 m x 15.24 m) roll
- 10' x 50' (3.0 m x 15.24 m) roll

Installation

TPO Membrane is quick to install, as minimal labor and few components are required.

TPO Membrane is adhered to a suitable substrate utilizing an appropriate Henry bonding adhesive.

Precautions

1. Sunglasses that filter out ultraviolet light are strongly recommended, as TPO Membrane is highly reflective. Installers should dress appropriately and wear sunscreen.
2. TPO Membrane may become slippery due to frost and ice buildup. Exercise caution during cold conditions to prevent falls. Exercise caution when walking on wet TPO Membrane as it may be slippery when wet.
3. Care must be exercised when working close to a roof edge

when the surrounding area is snow-covered, as the roof edge may not be clearly visible.

4. Use proper stacking procedures to ensure sufficient stability of rolls.
5. Store TPO Membrane in the original undisturbed plastic wrap in a cool, shaded area and cover with light-colored, breathable, waterproof tarpaulins.
6. Take care not to stand or place heavy objects on the edge of folded-over TPO Membrane, as this could cause a hard crease in the membrane.
7. Maximum sustained temperature not to exceed 160°F (71°C) for TPO Membrane.

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.” TPO Membrane is produced to deliver 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.

Henry Testing – Heat Aging

| | ASTM Requirement | Henry 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" (50.8 mm by 152.4 mm) piece of 45-mil (1.14 mm) TPO Membrane unbacked, placed in circulating hot-air oven.
- Criterion – no visible cracks after bending aged test specimen

around 3" (76.2 mm)-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 TPO 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. Henry requires its TPO Membrane to pass the equivalent of 40 years of exposure in the Q-Trac.

Henry Testing – Q-Trac

| | ASTM D6878 Requirement | Henry Requirement |
|---------------|------------------------|------------------------------------|
| ASTM TEST N/A | N/A | Equivalent of 40 years of exposure |

Environmental Cycling subjects TPO Membrane to repeated cycles of heat aging, hot-water immersion, and xenon-arc exposure.

- ASTM requirement – none
- Henry 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/m² (2000 hours at 0.70 W/m² irradiance) xenon-arc exposure

* Test specimen is 2.75" (69.85 mm by 140 mm) by 5.5" piece of TPO 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" (76.2 mm)-diameter mandrel.

Supplemental Approvals, Statements and Characteristics:

1. TPO Membrane meets or exceeds the requirements of ASTM D6878 Standard Specification for Thermoplastic Polyolefin-Based Sheet Roofing.
2. Henry TPO Membrane was tested for dynamic puncture resistance per ASTM D5635 using the most recently modified impact head and Henry TPO Membrane was watertight after an impact energy of 22.5 J (16.6 ft-lbf).

Typical Properties and Characteristics

| Physical Property | ASTM D6878 Requirement | 60-mil (1.52 mm) |
|---|--------------------------------|------------------------------------|
| Tolerance on Nominal Thickness, % ASTM D751 test method | +15, -10 | 10 |
| Thickness Over Scrim, in. (mm) ASTM D7635 optical method, average of 3 areas | 0.015 min (0.380) | 0.024 typical (0.610) |
| Breaking Strength, lbf (kN) ASTM D751 grab | 220 (976 N) min | 250 (1.1) min 360 (1.6) typical |
| Elongation Break of Reinforcement, % ASTM D751 grab method | 15 min | 15 min 25 typical |
| Tearing Strength, lbf (N) ASTM D751 proc. B 8 in. x 8 in. | 55 (245) min | 55 (245) min 130 (578) typical |
| Brittleness Point, °F (°C) ASTM D2137 | -40 (-40) max | -40 (-40) max -50 (-46) typical |
| Linear Dimensional Change, % ASTM D1204, 6 hours at 158°F | 1 max | 1 max -0.2 typical |
| Ozone Resistance, no cracks, 7X ASTM D1149 100 pphm, 168 hrs | PASS | PASS |
| UV Exposure (Xenon Arc), no cracks, 7X ASTM G155, min. exposure 10,080 kJ/m ² (4,000 hrs - 0.70 W/m ²) | PASS | PASS |
| Water Absorption Resistance, mass % ASTM D471 top surface only 166 hours at 158°F water | 3.0 max | 3.0 max 0.90 typical |
| Factory Seam Strength, lbf (N) ASTM D751 grab method | 66 (290) min | 66 (290) min |
| Field Seam Strength, lbf/in (kN/m) ASTM D1876 tested in peel | No requirement | 25 (4.4) min 60 (10.5) typical |
| Water Vapor Permeance, perms ASTM E96 proc. B | No requirement | 0.10 max 0.05 typical |
| Puncture Resistance, lbf (kN) FTM 101C, method 2031 (see supplemental section) | No requirement | 300 (1.3) min 350 (1.6) typical |
| Properties After Heat Aging ASTM D573, 32 weeks @ 240°F or 8 weeks @ 275°F No cracking when bent around 3" diameter mandrel Weight Change, % | PASS No cracking 1.5 max | PASS No cracking 1.0 max |
| Typical Weights lb/ft ² (kg/m ²) | | 0.33 |

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.

Radiative Properties

| | Test Method | TPO |
|---|------------------------|------|
| Initial solar reflectance | ASTM C1549 | 0.79 |
| Solar reflectance after 3 years | ASTM C1549 (uncleaned) | 0.70 |
| Initial thermal emittance | ASTM C1371 | 0.90 |
| Thermal emittance after 3 years | ASTM C1371 (uncleaned) | 0.86 |
| Thermal emittance | ASTM E408 | 0.90 |
| SRI - Initial (Solar Reflectance Index) | ASTM E1980 | 99 |
| SRI - 3 year aged (Solar Reflectance Index) | - | 85 |

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.

LEED® Information

| | |
|--------------------------------|---|
| Pre-consumer Recycled Content | 10% |
| Post-consumer Recycled Content | 0% |
| Manufacturing Location | Senatobia, MS Tooele, UT Carlisle, PA |
| Solar Reflectance Index (SRI) | 99 |

For more information, visit www.henry.com or for technical assistance call us at 800-486-1278. Refer to the Safety Data Sheet prior to using this product. The Safety Data Sheet is available at www.henry.com or by emailing Henry Product Support at productsupport@henry.com or by calling 800-486-1278.

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