



# Product Data Sheet

## MULE-HIDE PVC KEE HP MEMBRANE

### OVERVIEW

Mule-Hide's PVC KEE HP (High Performance) membrane is manufactured using DuPont® Elvaloy® KEE HP resin modifier. KEE HP enhances the performance of PVC compounds by providing outstanding thermal stability and flexibility while extending the low- and high-temperature performance limits of standard KEE. The addition of Elvaloy KEE HP, a non-volatile resin modifier, provides enhanced heat and chemical resistance.

The physical properties of the membrane are enhanced by a tenacious polyester fabric that is encapsulated by thick KEE HP-based top and bottom plies. The smooth surface of the KEE HP membrane allows a total surface fusion weld over a wide temperature range, creating a consistent, watertight, one-piece roof assembly.

### FEATURES AND BENEFITS

- Chemical resistance
- Energy efficiency
- Wide window of weldability
- Low-temperature flexibility
- Impact and puncture resistance
- Easy installation
- Solar, UV, ozone, and oxidation resistance
- Available in white, gray, and tan

### INSTALLATION

KEE HP roof systems are fast to install, as minimal labor and few components are required. The membranes weld quickly, cleanly, and consistently.

#### **Mechanically Attached Roofing System**

The mechanically fastened system starts with approved insulation being fastened with a minimum of 5 fasteners per 4' x 8' board. The KEE HP reinforced membrane is then mechanically fastened to the deck using HDP (#14) or EHD (#15) Fasteners and 2.4" Seam Plates. Adjoining sheets of KEE HP membrane are overlapped over the fasteners and plates and joined together with a minimum 1½"-wide hot-air weld.

#### **Fully Adhered Roofing System**

The fully adhered system starts with a suitable surface upon which to apply the appropriate bonding adhesive. Refer to respective product data sheets or Mule-Hide specifications and details for complete installation information.

*Review Mule-Hide specifications and details for complete installation information.*

### PRECAUTIONS

- Sunglasses that filter out ultraviolet light are strongly recommended, as the membrane's white surface is highly reflective. Roofing technicians should dress appropriately and wear sunscreen.
- Smooth surfaces may be slippery due to frost and ice buildup. Exercise caution during cold conditions to prevent falls.
- 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.
- Use proper stacking procedures to ensure sufficient stability of the materials.
- Exercise caution when walking on wet membrane. Membranes may be slippery when wet.
- Store KEE HP membrane in the original undisturbed plastic wrap in a cool, shaded area and cover with light-colored, breathable, waterproof tarpaulins. KEE HP membrane that has been exposed to the weather or contaminated with dirt must be prepared with PVC Membrane Cleaner prior to hot-air welding.

Revision Date: October 2017



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## SUPPLEMENTAL APPROVALS, STATEMENTS AND CHARACTERISTICS

- KEE HP meets or exceeds the requirements of ASTM D4434 Standard Specification for Poly (Vinyl Chloride) Sheet Roofing. KEE HP is classified as Type III and/or Type IV as defined by ASTM D4434.

Typical Properties and Characteristics				
Physical Property*	ASTM D4434 Requirement	50-mil	60-mil	80-mil
Thickness over scrim, in. (mm) ASTM D4434 optical method, ave of 3	0.016 min (0.40)	0.024 (0.61)	0.029 (0.74)	0.036 (0.91)
Weight, lbs/ft <sup>2</sup> (kg/m <sup>2</sup> )	----	0.33 (1.61)	0.38 (1.86)	0.51 (2.49)
Breaking Strength (MD x CD), lbf/in (kN/m) ASTM D751 grab method	275 min (48)	290 x 290 (51 x 51)	320 X 300 (56 x 52)	330 x 320 (58 x 56)
Elongation break of reinforcement (MD x CD) % ASTM D751 grab method	25 min	30 x 30	30 x 30	30 x 30
Tearing Strength (MD x CD), lbf (N) ASTM D751 proc. B, 8" x 8"	90 (400)	120 x 125 (534 x 556)	120 x 125 (534 x 556)	140 x 150 (623 x 667)
Low Temperature Bend, no cracks 5x at -40°C ASTM D2135	PASS	Pass -46°C	Pass -46°C	Pass -46°C
Linear Dimensional Change % ASTM D1204, 6 hours @ 176° F (80° C)	±0.5 max	0.4	0.4	0.4
Ozone Resistance, no cracks @ 7x ASTM D1149, 100 pphm, 168 hrs	PASS	PASS	PASS	PASS
Water absorption resistance, mass % ASTM D570 166 hrs @ 158° F (70° C)	±3.0 max	1.25	0.87	0.89
Puncture resistance Dynamic, J (ft-lb) ASTM D5635 Static, lbf (N) ASTM D5602	20 (14.7) 33 (145)	PASS PASS	PASS PASS	PASS PASS
Xenon-Arc Resistance, no cracks or crazing @ 10x, ASTM G155, 0.35 W/m <sup>2</sup> at 340 nm, 63°C B.P.T, 12,600 kJ/m <sup>2</sup> total radiant exposure 10,000 hrs	PASS	PASS	PASS	PASS
Properties after heat aging ASTM D3045, 56 days @ 176°F Breaking strength % retained Elongation rein., % retained	90 min 90 min	90 min 90 min	90 min 90 min	90 min 90 min

\*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 or specification range for any particular property of this product.

Radiative Properties for ENERGY STAR®, Cool Roof Rating Council (CRRC) and LEED				
DESCRIPTION	TEST METHOD	WHITE PVC	TAN PVC	GRAY PVC
ENERGY STAR® initial solar reflectance	Solar Spectrum Reflectometer	0.82	0.74	0.57
ENERGY STAR® solar reflectance - 3 yrs	Solar Spectrum Reflectometer (uncleaned)	pending	pending	pending
ENERGY STAR® initial emissivity	ASTM E408	0.95	pending	pending
CRRC initial solar reflectance	ASTM C1549	0.82	0.74	0.57
CRRC solar reflectance after 3 years	ASTM C1549 (uncleaned)	0.71*	0.63*	0.50*
CRRC initial thermal emittance	ASTMC1371	0.89	0.88	0.88
CRRC thermal emittance after 3 years	ASTM C1371 (uncleaned)	0.84*	0.84*	0.85*
CRRC SRI (Solar Reflectance Index)	ASTM E1980	103	91	67
CRRC SRI (Solar Reflectance Index - 3 yrs)	ASTM E1980	86*	75*	57*
LEED™ thermal emittance	ASTM E408	0.94	pending	pending

\*Rapid Ratings

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## **SUPPLEMENTAL APPROVALS, STATEMENTS AND CHARACTERISTICS (continued)**

Mule-Hide White PVC KEE HP Membranes are LEED compliant. Mule Hide White PVC is also an ENERGY STAR® and California Title 24 rated roof product.

An ENERGY STAR qualified low slop 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 not permitted by the ENERGY STAR test protocol. Energy Star is only valid in the United States for Roofing Products.

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.

<b>LEED Information</b>	
Pre-consumer Recycled Content	10%
Post-consumer Recycled Content	0%
Manufacturing Location	Greenville, IL
Solar Reflectance Index (SRI)	White: 103, Tan: 91, Gray: 67

## **PROTECTION & SAFETY**

Mule-Hide maintains Material Safety Data Sheets on all of its non-exempt products. Material Safety Data Sheets contain health and safety information for your development of appropriate product handling procedures to protect your employees and customers. Mule-Hide's Material Safety Data Sheets should be read and understood by all of your supervisory personnel and employees before using Mule-Hide products in your facilities.

## **ADDITIONAL INFORMATION**

The information given on this PDS is subject to change without notice. Always check the Mule-Hide website at [www.mulehide.com](http://www.mulehide.com) for the latest information, changes and updates or contact Mule-Hide Products Company at 800-786-1492.

## **DISCLAIMER**

The statements provided concerning the material shown are intended as a guide for material usage and are believed to be true and accurate at the time of printing. No statement made by anyone may supersede this information, except when done in writing by Mule-Hide Products Co., Inc. Since the manner of use is beyond our control, Mule-Hide does not authorize anyone to make any warranty of merchantability or fitness for any particular purpose or any other warranty, guarantee or representation, expressed or implied, concerning this material. This product may be eligible for a Mule-Hide warranty, please check the Mule-Hide website at [www.mulehide.com](http://www.mulehide.com) or contact Mule-Hide directly at 800-786-1492 for details. Buyer and user accept the product under these conditions and assume the risk of any failure, any injury person or property (including that of the user), loss or liability resulting from the handling, storage or use of the product whether or not it is handled, stored or used in accordance with the directions or specifications. Mule-Hide must be notified in writing of any claims and be given the opportunity to inspect the alleged failure before repairs are made.