

BRADEN ROOFING NEWS™ V

HOMEOWNER'S GUIDE TO TPO FLATROOFS

Welcome to BRN V. As always, we appreciate your interest in Braden Roofing, THE ONE WITH THE GREAT REPUTATION™. It is our sincere hope that these news articles continue to educate the general public about roofing products and installation. Our long-term goal is to make the roofing trade into a more respected institution for generations to come.

The roofing product we will examine in this article is TPO flatroofing. TPO is an affordable, durable, reliable, and energy-efficient flatroofing product which can be installed in both residential and commercial applications.

What exactly is TPO? TPO stands for Thermoplastic polyolefin. Obviously, it is a thermoplastic. The best way to think of TPO is in terms of car dashboards. Remember the old car dashboards which used to burn up and crackle apart in the sun? Well, the new car dashboards don't do that anymore. That's because they have TPO in them. Obviously, TPO is a product which can withstand a tremendous amount of ultraviolet duress without suffering damage.

A car dashboard would not ever be white, or else we would go blind driving our cars. However, as a roofing product, TPO is available in a whitetop. It is also available in a light gray and a soft cedar color.

At Braden Roofing, we are HUGE fans of TPO flatroofing. We feel this product, when properly installed, solves almost every single problem associated with traditional flatroofing products. TPO is a great product in both residential and commercial applications. For more information direct from the manufacturer, feel free to contact Mule-Hide Products Co., Inc., www.mulehide.com, 800-786-1492. Braden Roofing is an authorized installer of Mule-Hide products. Let's take a quick look at some TPO roofs!

As you look at the first few pictures, you will undoubtedly notice the most obvious and striking aspect of TPO flatroofing. It's white! As stated, most TPO

roofs we install are whitetops. Because TPO is a whitetop, it is somewhat difficult to photograph. Taking pictures of TPO is a lot like taking pictures of a snowstorm. The closer you get, the less you see. Still, the following photos give you a good idea of what a TPO roof is all about. In PICTURE #1, we see a large flatroof on the back of a residence. In this picture, we can see the smooth cured-out surface of a TPO roof which we had installed about a year prior to this photograph. Because this roof is about a year old, it has collected a little bit of dirt and debris. At this angle, we can see the seam pretty clearly defined from the dust residue. Seen from the other side, the seam would be much less visible despite the dust residue. It is my personal opinion that most asphalt based systems are really pretty ugly. Although you really don't see most flatroofs, a TPO is far more cosmetically appealing than traditional tar-based roof systems.

Incidentally, we typically prefer not to install vents on any kind of flatroof. We prefer to vent out other parts of the roof, or maybe install gable vents. In the case of this home, those were not viable options. Our only other choice would have been to have no vents at all. We decided to install vents on the flatroof instead of not having any vents at all.

In PICTURE #2, we see another well-installed TPO roof on another residence. As you will soon see, many of the flatroofs we install on residences are bump-out dormers on the back half of a roofline. We see the same application in PICTURE #3. PICTURES #4 and #5 show several more back dormers with TPO flatroofs.

TPO works extremely well in this kind of application because of the very nature of TPO. Whitetop TPO is proven to reflect up to 78% of the sun's light energy. What this means is that the living area underneath the flatroof will be dramatically cooler during those lovely scorching hot summer days in the Midwest. In contrast, an asphalt flatroof system will have a surface temperature of at least 170 degrees Fahrenheit (perhaps 200°F or more). What this means is that many of the upstairs bedrooms below these dormer flatroofs are unnecessarily hot and uncomfortable during the summer. Such dramatic heat buildup right next to a living area probably doesn't do the homeowner's air conditioning bill any favors. A TPO roof can make most of these upstairs rooms dramatically more comfortable. Additionally, in some cases, by using an insulation board as a substrate below the TPO, we can make an upstairs bedroom warmer in the wintertime, also.

This same principle holds true in commercial applications. When an entire building of, say, an apartment complex or office building is covered in TPO, the



Picture #1 A TPO whitetop on a residential flatroof.



Picture #2 Many of the TPO flatroofs we install on homes are bump-out dormers.



Picture #3 Another bump-out dormer with a TPO flatroof.



Picture #4 Detail of a dormer flatroof.



Picture #5 Another TPO roof on a dormer flatroof.

energy savings can be quite dramatic. Many times on commercial buildings, the air conditioning units are located right on the rooftop. The A/C units pull the super-heated air off the rooftops and use this blazing hot air to blow past the condenser coils and keep the building cool. This is doubly inefficient and also puts extra strain on the cooling system. Not only does this cost the building owners more in terms of energy consumption, but it may also cause the air conditioners to break down prematurely. An overheated roof can be expensive in many ways.

The Department of Energy has done studies which show that this product can actually pay for itself over the lifetime of the roof via energy savings. TPO is an Energy Star rated product. This means that there are tax credits available for using this product. Check with your accountant.

The one minor drawback of a whitetop is that it can be extremely bright when the sun is shining.

TPO is also available in light gray or soft cedar colors. Colored TPO is frequently used when there are windows overlooking the flatroof. By using a colored TPO in this application, we are not going to blind anybody who might look out the overlooking window. We see an example of this in PICTURE #6.

By the way, even colored TPO does a very good job of dispersing heat. The surface temperature of a colored TPO is almost as good as the whitetop. One of the reasons for this is that, in addition to having a 78% reflectivity, TPO roofs also have about an 80% emissivity.

Emissivity is a measure of conductivity. The best way to think of emissivity is to imagine a steel hammer with a rubber handle lying on a sidewalk in the hot midday sun. The bright silver colored metal will undoubtedly reflect more sunlight than the black rubber handle. However, when you pick up the hammer, you would be wise to pick it up by the rubber handle rather than the metal. The metal is going to be far hotter than the rubber handle. The reason is that the rubber handle has a far higher emissivity than the metal. The metal may reflect more heat energy away, but whatever heat energy is not reflected stays inside the metal. The rubber handle may absorb more heat energy from the sun, but that heat energy is immediately dispersed. A good emissivity percentage helps keep heat absorption to a minimum.



Picture #6 We frequently use colored TPO on flatroofs with overlooking windows. This way nobody looking out a window gets blinded by reflecting sunlight.

TPO can also handle uneven surfaces better than other kinds of flatroofing. In PICTURES #7 and #8, we see another bump-out dormer with a TPO roof. In this case, the dormer has two valleys and a ridge. TPO handles these uneven shapes better than other roof systems, which tend to pop seams as they cure out and contract.

TPO also contracts a little bit as it cures out. Most roofing products do need to contract in order to cure out properly. TPO, however, contracts far less than most. It contracts enough to smooth out wrinkles over time (and there usually WILL BE some wrinkles in a TPO roof immediately after installation)—yet not so much as to damage the product.

TPO seams are extremely durable. The seams are actually heat-welded, not glued. A heat welded seam is superior because it is completely monolithic. This means that the two sections of roof actually melt together to basically become one entity. A properly constructed seam is actually stronger than the rest of the material. Furthermore, TPO comes in 6 foot or 10 foot sheets. This means that a TPO roof will have about 1/3 the seams of traditional rolled flatroof materials.

Because there are fewer seams and the seams are so strong, TPO tends to stand up well even when there is ponding on a flatroof.

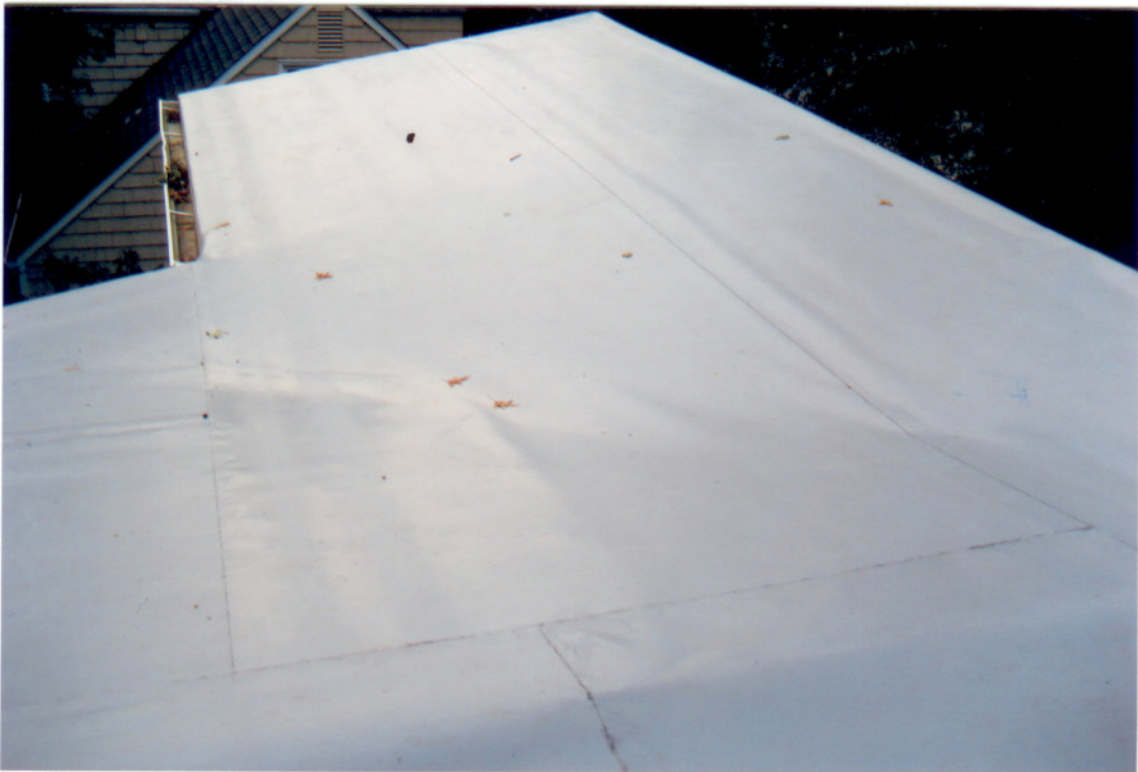
NOTE! Ponding is NEVER a good thing on a flatroof, regardless of the construction material! At Braden Roofing, we recommend reducing or preferably eliminating ponding whenever possible. By tapering the roof substrate or adding drains we can frequently solve or at least ameliorate most ponding issues. However, many roofs do not lend themselves well to any solution to the ponding issue. If the ponding issue cannot be solved in an economic manner, a TPO roof is your best option.

With roofing, as with life, the biggest problems are the transitions. At Braden Roofing, we are extremely aware of installing splices and flashes properly. In PICTURE #9, we see yet another bump-out dormer splicing into a concrete tile roof. As a general rule, splicing into a tile roof is not an easy task, but we handle it admirably. PICTURE #10 shows a nicely constructed ridgeline splice. This splice was constructed so that we did not nail any ridge shingles through the flatroof, yet were able to hide the flatroof so that one cannot see it from the front.

PICTURE #11 shows a plumbing pipe flashing detail. In PICTURE #12, we see proof positive that we can effectively flash a chimney even if it is on a flatroof.



Picture #7 TPO roofs conform well to uneven roof planes.



Picture # 8 TPO seams remain strong and secure even in valleys and over ridges.



Picture #9 At Braden Roofing, we do a good job of splicing into other rooflines- even if it is a concrete tile.



Picture #10 Ridgeline splice.



Picture #11 Plumbing pipe flashing detail.



Picture #12 We can properly flash a chimney, even on a flatroof.

PICTURE #13 shows another chimney with a slightly different but still effective flashing construction. In PICTURE #14, we see a skylight frame properly flashed. It may appear anathema to have a skylight on a flatroof, but in the hands of a skilled craftsman such as those at Braden Roofing, it's really not that tough.

PICTURE #15 shows a closeup of an edge construction. There are actually two kinds of edge constructions and this is the simpler of the two. We can also see this construction in DRAWING #1. The flatroofing basically just rolls over the edge of the roof and is secured with a termination bar, or "term" bar. The excess slack of flatroofing suspends down and into the gutter, so that water drains properly into the gutter. This is a very simple construction which we frequently use on smaller residential applications.

On commercial applications, we use a slightly different construction. Per written guidelines, we use a construction like we see in DRAWING #2. The TPO flatroofing once again suspends over the edge and into the gutter. It is again typically secured with a term bar. The drip-edge construction then has a large (typically 4"x 4") drip edge installed directly on top of the edge, secured by fasteners right through the flatroofing. It is then covered over with a small piece of TPO which is called a seal down strip. It may seem counter-intuitive to have the drip edge fastened directly into the roof. After all, a hole in a flatroof is not a good thing, even if it is covered over with the seal-down strip. It may also seem odd to have the seal-down strip attached to the top of the flatroof, as opposed to being tied together with a seam. One may legitimately wonder if this small backseam catches water.

The answer is a very qualified "yes, but..." Yes, but the amount of water caught against the backseam is negligible. We see this pictured very clearly in PICTURE #16. If we look closely, we can see just a tiny trickle of water running along the backseam. This is not considered a mechanical problem. Furthermore, the construction seen in DRAWING #2 is pretty much taken directly from the installation guide provided by the manufacturer. This drip-edge construction is the manufacturer's preferred installation.

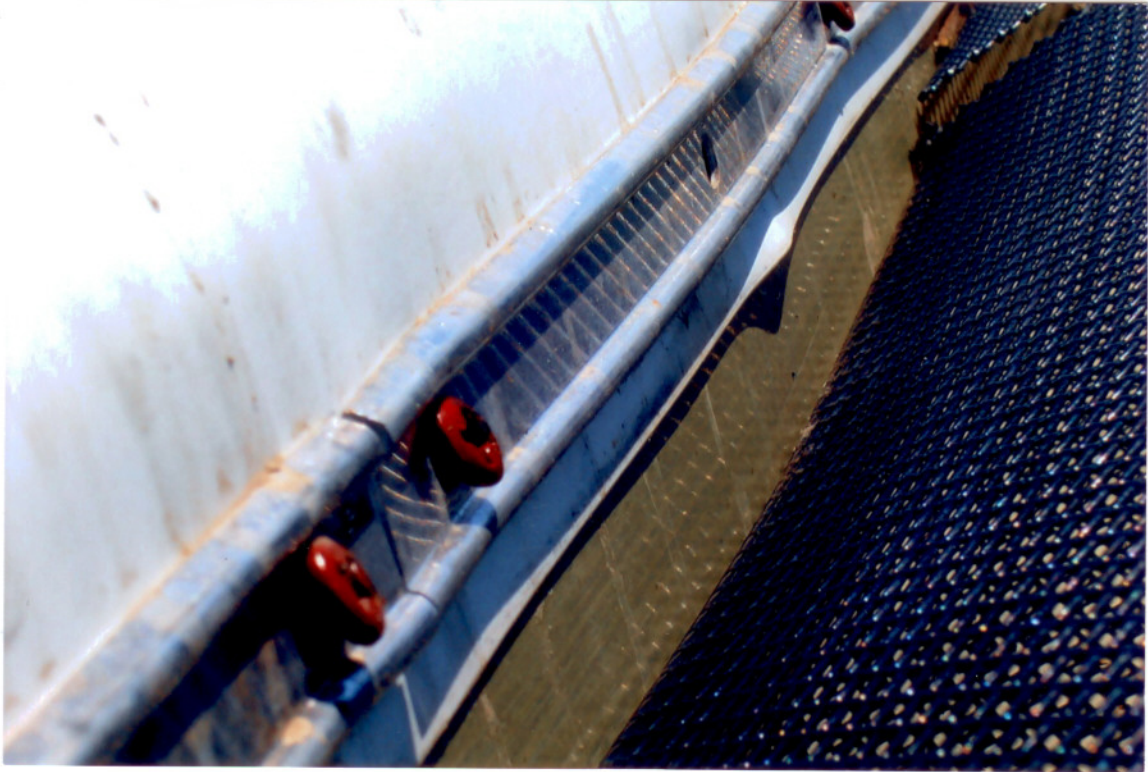
For that matter, we can certainly install a drip edge construction on a residential application. It is not, in my opinion, necessary, and it does cost a little bit more. Nonetheless, we are aware that some customers may not like the simple edge construction from a cosmetic standpoint. In PICTURE #17, we see a drip edge construction on a residential application. It really does make a nice clean looking edge.



Picture #13 This is a slightly different, but still effective flashing construction.



Picture #14 A properly flashed skylight.



Picture #15 Edge Construction close-up.



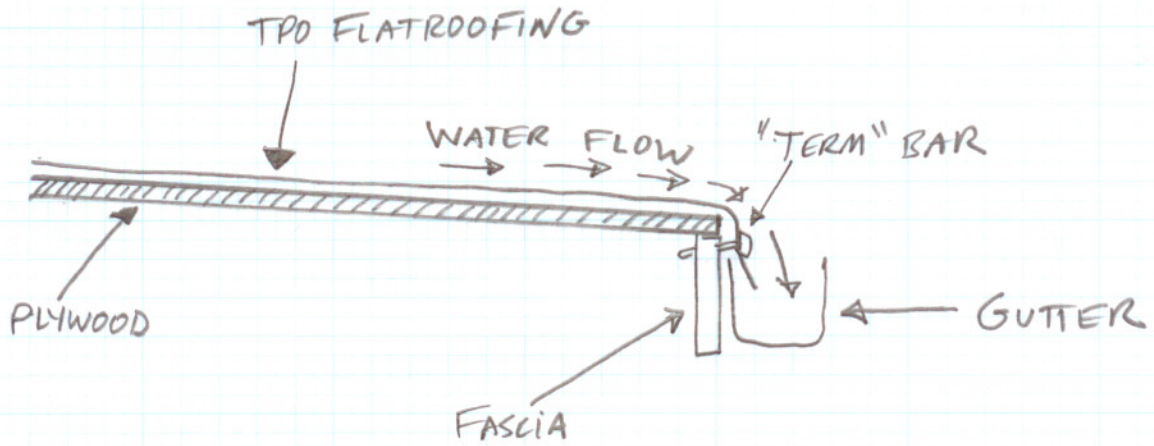
Picture #16 The amount of water caught against the backseam of the seal-down strip is negligible.



Picture #17 Residential flatroof with a drip edge.

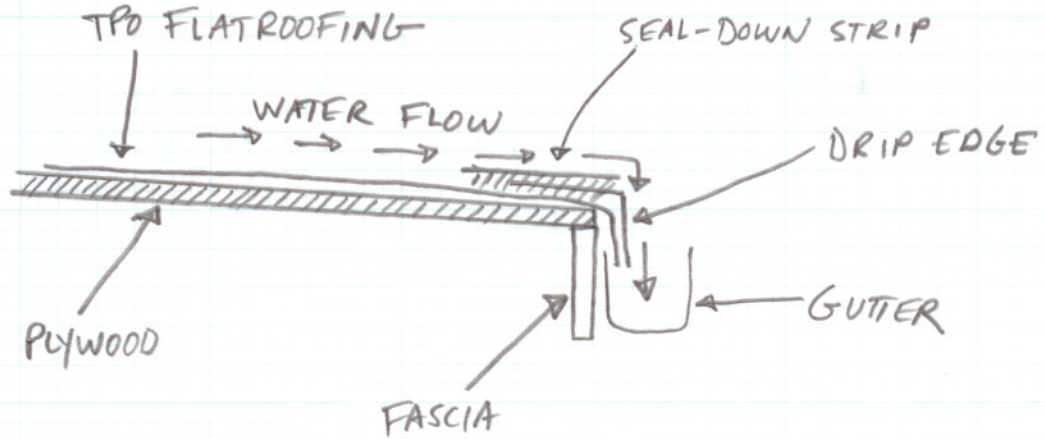
DRAWING #1

SIMPLE EDGE CONSTRUCTION
(FOR RESIDENTIAL APPLICATIONS)



DRAWING #2

METAL DRIP-EDGE CONSTRUCTION
(FOR COMMERCIAL APPLICATIONS)



We have installed many, many TPO flatroofs in residential applications. It would appear, however, that the most obvious application of this terrific product is on commercial flatroofs. PICTURE #18 shows a really nice install on a small strip mall. In PICTURE #19, we see a closeup of the parapet. With TPO, we can wrap an entire parapet. The material stays pliable even as it cures out, so it will not tear or crack when stretched over parapet walls. Frequently, we can re-use the old parapet cap, as seen in PICTURE #20. When the old cap is too rusty and deteriorated, we can custom construct new parapet caps, as seen in PICTURE #21.

Whether installed in a residential or commercial application, a properly installed TPO flatroof is one of the most durable, effective, and cost-effective roof systems available today. Braden Roofing, THE ONE WITH THE GREAT REPUTATION, is a certified installer of TPO products. As always, all craftsmanship on reroofs is warranted for five years. As a certified installer, we can also provide various extended warranties on labor and material. We are always happy to answer your questions and concerns regarding TPO or any other roofing product.

Thank you for your interest in Braden Roofing, THE ONE WITH THE GREAT INFORMATION.

For a free consultation, please call Braden Roofing:

(913) 341-0200, (816) 931-1959.

For more information from the manufacturer, please contact:

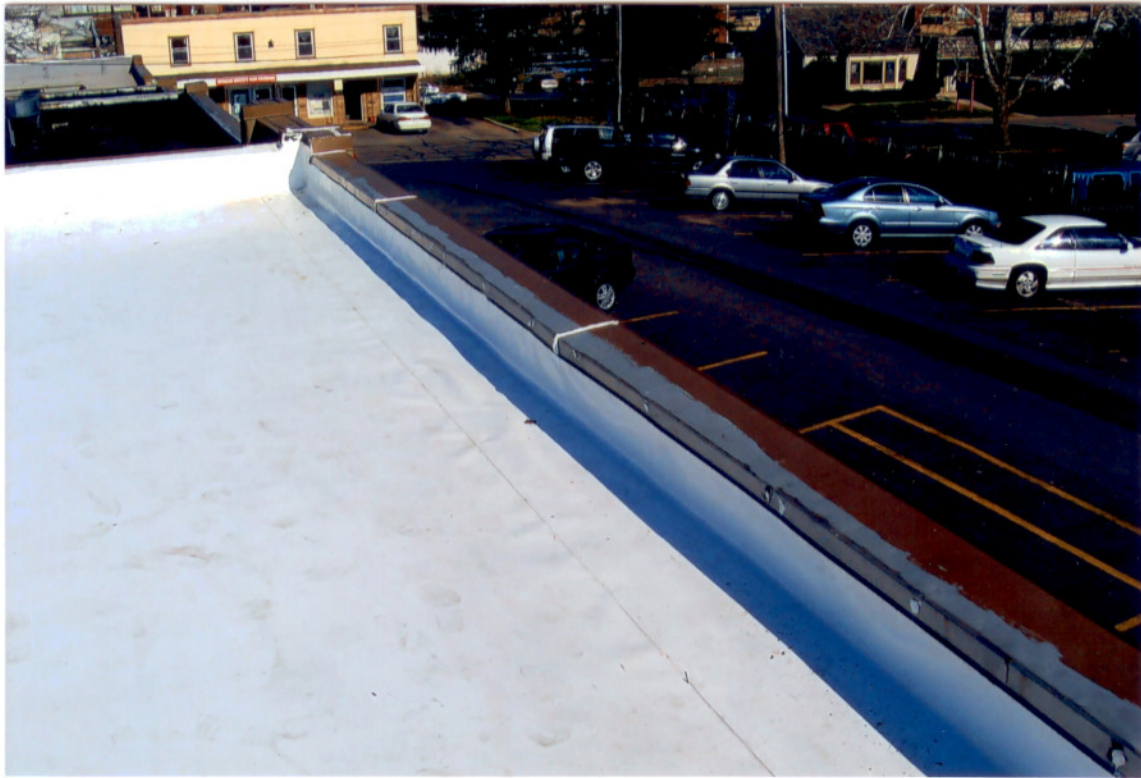
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Picture #18 TPO was the perfect product for this strip mall.



Picture #19 TPO remains pliable long after installation, so it will not tear or crack when stretched over parapet walls.



Picture #20 We can frequently re-use old parapet caps.



Picture #21 If necessary, we can custom construct new parapet caps.

TPO Systems

The Affordable White Roof

The Performance of Rubber
with Heat-Welded Seams:
TPO has the weathering
and low temperature
flexibility of EPDM with the
superior seam strength of
Heat Weldable membranes!

10' Wide Sheets

Less Labor

Less Waste

Fully Adhered

Mechanically Attached

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"The name trusted in roofing since 1906"

What now? An affordable white roof from the name trusted in roofing since 1906 - Mule-Hide. Bringing you the flexibility you've been looking for in a TPO membrane. Mule-Hide's TPO offers the best performance you've come to expect.



Mule-Hide TPO means lower labor costs.

- Available in widths of 8' & 10' for less seams and less labor compared to standard PVC sheets.

Mule-Hide TPO offers a thicker top ply.

- More product on top of the scrim where you need it most, one of the thickest top plies in the industry.

Mule-Hide TPO has minimal shrinkage.

- Shrinkage is a major factor affecting membrane performance and longevity.
- TPO reinforced membranes offer watertight integrity you can count on.

System Benefits

Easy to Install & Repair - Mule-Hide TPO Roofing Systems install quickly and economically. UL & FM listed assemblies are available upon request. All the accessories you need to complete roof details around edges and penetrations are also stocked locally.

Energy Efficient Roofs - White surfaces have been shown to reflect up to 78% of the sun's rays to reduce air-conditioning costs. The superb reflectivity of white TPO even reduces the heat build-up under the membrane.

The Best Lifecycle - TPO provides excellent resistance to fire, UV, airborne bacteria, and industrial pollutants such as air conditioning coolants. Contains no chlorine, a plus for the environment.

Strength - Keeps moisture out, yet lightweight, making it ideal for new construction and retrofit installations without adding excessive weight to the roof deck. TPO can handle the desert sun, sand, Arctic freezes and torrential downpours.

Flexibility - The membrane remains flexible in hot or cold temperatures so it will not split or crack.

Repairable - TPO membrane remains repairable year after year, allowing for ease of future cutouts and tie-ins. Stands up to rooftop traffic, tools and equipment. Can be power washed to retain like-new appearance.

Environmentally Friendly - No plasticizer migration, no chlorine, and recyclable.

Warranties Available

Mule-Hide offers Standard System warranties and Membrane-Only material warranties. All System warranty eligible projects are inspected and approved by a Mule-Hide representative prior to the issuance of the warranty.

The Affordable White Roof

TPO



Installed Cost Value

Other white membranes command a premium price, but thanks to manufacturing technology originally developed in the automotive industry (impact and UV resistant bumpers), a Mule-Hide TPO Roof is "The Affordable White Roof".

Environmentally Friendly

- No plasticizer migration
- No chlorine
- Recyclable

Reinforced TPO .045", .060", & .080"

- Thermoplastic polyolefin based for superior strength and weatherability
- Lightweight yet highly resistant to tears, impact, punctures, & wind uplift
- Ideal for both new construction and reroofing
- Reinforced membrane easily handles building thermal expansion & contraction
- Minimal shrinkage - ideal for mechanically attached or fully adhered systems
- Meets or exceeds ASTM performance standards

Complete line of Heat-Weld Accessories

- **TPO Bonding Adhesive**
- **TPO Membrane Cleaner** (clear)
- **TPO Cut Edge Sealant** (white)
- **Flashings & Flashing Strips** - White TPO Flashing Membrane
- **TPO Pipe Boots & Pre-Fabricated Accessories** - TPO Pipe Boots with Tape for pipe flashings and penetrations. Pressure sensitive Pre-Cut Corners (Inside/Outside) - can also be used for T-joint patches. Pourable sealer pockets - allow easy field fabrication versus metal.
- **TPO Vinyl Coated Metal**
- **TPO Walkway Pads** (gray)
- **Anchoring Accessories** - Drill Point Fasteners, Galvalume Stress Plates (for insulation), Heavy Duty Fasteners (for membrane), Barbed Seam Plates
- **All-Purpose Bar** - Use as anchor, batten, and termination bar

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or visit our website

www.mulehide.com

for a distributor listing
or technical information.



"The name trusted in roofing since 1906"

MULE-HIDE PRODUCTS Co., Inc.

2924 Wyetta Dr.
Beloit, WI 53511-3964

Phone (608)365-3111
Fax (608)365-7852

PO BOX 1057
Beloit, WI 53512-1057



What Special Solutions Support means to you:

Individualized Assistance

Attention to Detail

Project Level Technical Assistance

Alternative Methods of Installation

The story behind the Mule-Hide name...

A four horse wagon was stuck in the mud. To help out, another driver hitched two more horses but they were still stuck. Then a wagon with two mules came by and the men replaced all six horses with the two mules. The mules dug down & pulled the wagon out. Their impressive strength was the inspiration for the name that has been trusted in roofing since 1906.



This information herein is based upon data and knowledge considered to be true and accurate and is provided for the contractor's consideration, investigation and verification. However, Mule-Hide Products Co., Inc. does not warrant any results to be obtained. Statements concerning possible use of Mule-Hide products are made without knowledge of your particular roof and such an application may not be fit for your particular purpose. MULE-HIDE DISCLAIMS ALL WARRANTIES, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, except written warranties attached to Mule-Hide products and written warranties signed by an officer of Mule-Hide.