

Synthetic (Polyolefin) Roof Underlayments— an Evolving Market

By Mark C. Strait

Polyolefin-based synthetic roof underlayments, generally new to the U.S. market, continue to evolve. Introduced mainly by companies whose core business is packaging, most synthetic roof underlayments have been changed and modified since being introduced. This seemingly is because of limited understanding of the U.S. roofing market by foreign companies though a U.S.-owned and -operated company with strong roofing technical expertise has offered a synthetic polypropylene underlayment line for the last three years. The market will determine over the long haul whether these changes will draw additional architects, contractors and roofing applicators away from traditional asphalt-based roofing felts, such as Type 15 and Type 30.

The clear advantages of new polyolefin underlayments for the roofing industry are their high wind resistance because of their high tensile strength; extreme light weight, which reduces installation time and installer fatigue; and long-term ultraviolet (UV) resistance of which traditional tar-paper felts Type 15 and Type 30 and SBS-modified underlayments have none. And unlike traditional tar-paper felts and SBS-modified underlayments, synthetic underlayments do not rot or absorb moisture and wrinkle and shrink like tar-paper felts.

The market has lumped all new polyolefins into the “synthetic roof underlayments” category as if they were the same. This is not true, so it is important purchasers be aware of important differences that may impact roof design requirements.

Characteristics and Considerations

The importance of these “state-of-the-art” improved “nailed-in-place” roof underlayments and their labor-saving advantages are being recognized by the roofing industry, which is slow to change. Reluctance by contractors to go beyond comparing the per-square cost of new synthetic underlayments to Type 15 and Type 30 felts, which is easier to quantify, is why more roofs are not being installed using new synthetic underlayments.



PHOTOS COURTESY OF KIRSCH BUILDING PRODUCTS LLC, SIMI VALLEY, CALIF.

This home features polyolefin-based synthetic roof underlayment. It is important purchasers be aware of underlayment differences that may impact roof design requirements.

However, roofing contractors should consider other factors, such as these synthetic underlayment offerings:

- Reduced labor costs during installation
- Fewer or eliminated leak call backs
- Less potential for “water-intrusion” liability when projects are left “dried in” while waiting for back-ordered primary roof covering products
- Less liability and call backs with completed roof systems
- Less damage to roof underlayments by other trades that cannot be billed
- The potential for reduction in workers’ compensation claims because lightweight synthetic underlayments are easier to load, handle and install, resulting in less fatigue and wear and tear on installers
- Increased ability to safely walk on them even when wet further reducing potential injuries (applies to a few synthetic products)

As mentioned earlier, most synthetic roof underlayments have been changed or modified in some way, and underlayment thickness, tensile strength and abrasion resistance will vary. The two main changes have come in the areas of slip resistance and product color.

Slip resistance

Most products were introduced with no slip resistance or limited slip resistance when dry. Slip resistance when the underlayment surface is wet or dusty has been a problem for some manufacturers. It is important to compare the slip resistance of the current synthetic underlayments when dry and especially when wet. Two companies currently claim a patented slip-resistant surface layer though only one has a patent on this technology.

Color

Surface color also has changed from black to gray. Gray allows for lower surface temperatures when exposed to sunlight, which makes the underlayment user friendly, and reduces temperatures for underlayments sensitive to heat. These color changes will not impact underlayments sensitive to temperature changes, especially at higher temperatures once the primary roof covering is installed and reflective value of gray is lost.

Polypropylene or Polyethylene

When considering which synthetic roof underlayment to use in a particular roof system, it is important to consider the primary roof covering being installed, exposure time of the underlayment prior to the primary roof installation, amount of foot traffic over the underlayment prior to the primary roof installation, weather conditions and fastening requirements. When it comes to temperature, polyolefin's have differences that can be critical to a roof system's performance.

Synthetic roof underlayments mainly fall into two categories, polypropylene and polyethylene. Polyethylene generally has a lower softening and melting point. Polypropylene has a higher softening and melting point with a softening point above high-end roof system temperatures. Commercial low-slope high-value/long-term TPO roof systems are made from polypropylene. Synthetic underlayments made with polyethylene are prone to expand and contract with changes in temperature, especially at high-end roof system temperatures, which are experienced during normal summer conditions across the United States and at mountain elevations where UV and roof deck temperatures can be extreme.

Because of polyethylene underlayments' high tensile strength, their expansion and contraction is prone to loosen and pull roof fasteners from their attachment substrate and/or cause the underlayment to tear at the nail shank, allowing the entry of moisture and/or creating a system susceptible to wind damage. As mentioned earlier, some polyethylene underlayment manufacturers have changed their product color from black to gray to overcome this condition.

When a direct-deck metal roof system is installed over a polyethylene underlayment, the underlayment's temperature easily is elevated to at least 180 F and can reach 230 F under some metal roof systems, causing the underlayment to begin to soften and expand. As the roof system cools throughout the night, the underlayment shrinks past its installation temperature, causing the underlayment to tear over time at the nail shank. Normal daily roof temperature swings of more

Comparison of Polypropylene and Polyethylene Synthetic Roof Underlayments

	Slip resistance wet	UV protection	High-temperature resistance	Abrasion resistance	Nail sealability
Patented 100 percent polypropylene-coated/ woven tape fabric with slip-resistant fiber surface	Excellent	12 months	Excellent	Excellent	Excellent
Polyethylene-coated woven tape with fishnet nodular surface	Fair	6 months	Fair	Good	Fair
Polyethylene-coated woven tape with polypropylene fiber surface	Poor	3 months	Poor	Fair	Poor
Polypropylene-coated spun-bound fiber	Poor	6 months	Good	Poor	Poor

than 100 F stress the underlayment daily. These extreme temperatures are below the softening point of polypropylene underlayments so the polypropylene underlayments remain in a static condition, allowing them to remain sealed around nails' shanks. One polypropylene underlayment tested by Intertek Testing Services, Coquitlam, British Columbia, Canada, has passed nail-sealability test ASTM D1970 per the International Conference of Building Officials, which now is the International Code Council's AC 48 testing criteria required for peel-and-stick underlayments.

Synthetic underlayments made from polyethylene and polypropylene experience similar problems associated with underlayments exclusively made with polyethylene. This expansion and contraction may not be as big an issue in colder climates or with certain roof installations.

Exposure

Estimated exposure time is important because synthetic roof underlayments can be exposed for different periods of time based on their UV resistance. Most synthetics claim a six-month exposure timeline with one polypropylene underlayment stating a 12-month exposure time. Nonetheless, synthetics are far superior to tar-paper felts and SBS-modified underlayments, which begin to deteriorate as soon as exposed to direct sunlight. Most Type 15 and Type 30 felt and SBS-modified underlayment manufacturers have a 30-day maximum exposure time. Sensitivity to heat, as mentioned earlier, should be considered because a polyolefin roof underlayment's UV resistance is deteriorated by frequently elevating the underlayment to temperatures near its softening point in the same way metal will weaken when heated repeatedly and then cooled slowly.

Foot Traffic

The amount of foot traffic expected on a roof should be considered when choosing the appropriate roof underlayment because abrasion resistance will vary greatly between synthetic underlayment products. Underlayments made with a spun-bound fiber core do not hold up well against abrasive materials, such as roof tile debris and excessive foot traffic. Underlayments made with a cross-woven tape core hold up best to abrasion with woven polypropylene having the best abrasion resistance to roof tile debris and excessive foot traffic.

Weather

Weather conditions may require nail sealability by the synthetic underlayment to prevent moisture intrusion where the underlayment is to be exposed for longer than normal time periods. Again, underlayments that are temperature sensitive may be a problem because expansion and contraction by the underlayment may break the seal at the nail shank. Most synthetics hold up exceptionally well to high winds when fastened properly. This eliminates call backs and reinstallations, which are common with traditional roofing felts and even newer, softer-when-heated SBS-modified asphalt underlayments.



These photos show SharkSkin™ underlayment. Synthetic underlayments provide moisture and ultraviolet protection, have a high tensile strength and resist wind.

Fasteners

When it comes to fastening synthetic underlayments to roof decks, most require a corrosion-resistant plastic cap, metal round cap or metal simplex-type roofing nails. Only one polypropylene roof underlayment can be installed with standard 3/8 of an inch (9.5 mm) head hammer-driven or gun-driven galvanized roofing nails. The tensile strength of the underlayment will determine the amount and pattern of nailing that is required. Improper fastening and the use of the wrong fasteners create unnecessary problems. Synthetics should not be installed with staples because the staple can cut the underlayment or allow the underlayment to tear away in high winds. These are common problems with traditional felts and SBS-modified underlayments; the newer synthetic underlayments seem to be held to a higher standard even when improperly installed. SBS-modified underlayments must be installed with a plastic cap and/or some kind of washer-type roofing nail, not staples and/or standard 3/8 of

Comparison of Polypropylene Synthetic Roof Underlayment and Type 15, Type 30 and SBS-modified underlayment felts

	Will not rot or wrinkle	Five times the coverage per roll	UV protection	Installation speed	Cooler to handle	Ball sealability/ASTM
Patented polypropylene-coated woven/tape fabric with slip-resistant fiber surface	Yes	Yes	12 months	Fast	Yes	Yes
Type 15 and Type 30 felt	No	No	None	Slow	No	No
SBS-modified underlayment	No	No	None	Slow	No	No

The beauty of COR-A-VENT® - what you DON'T see is what you get!

COR-A-VENT® is the ideal companion for today's popular metal roof designs. It disappears beneath the ridge cap and easily adapts to any architectural style. The unobstructed airways promote free airflow that helps prevent "sweating" and protects the attic and roof material from moisture damage.

A WELL VENTED ROOF IS A BEAUTIFUL THING

Choose from three great lines of COR-A-VENT products:

- V-600...** • 20 sq. in. Net Free Vent Area (NFVA) • 1" profile
 - Available in 11" & 8 1/2" widths
- X-treme X-5...** • Weather impenetrable, for extreme conditions
 - 17" NFVA • 1" profile
- V-300...** • 13.5" NFVA • Low 5/8" profile
 - Available in 11", 8 1/2" & 7" widths



Enjoy the beauty and low maintenance of a metal roof and make it last by using COR-A-VENT - guaranteed for the life of your roof.

ICBO Evaluated, see report #4838



A Trusted Name in Attic Ventilation Since 1976!™

COR-A-VENT, INC.

P.O. Box 428 • Mishawaka, IN 46546-0428

Phone: (800) 837-8368 Fax: (800) 645-6162

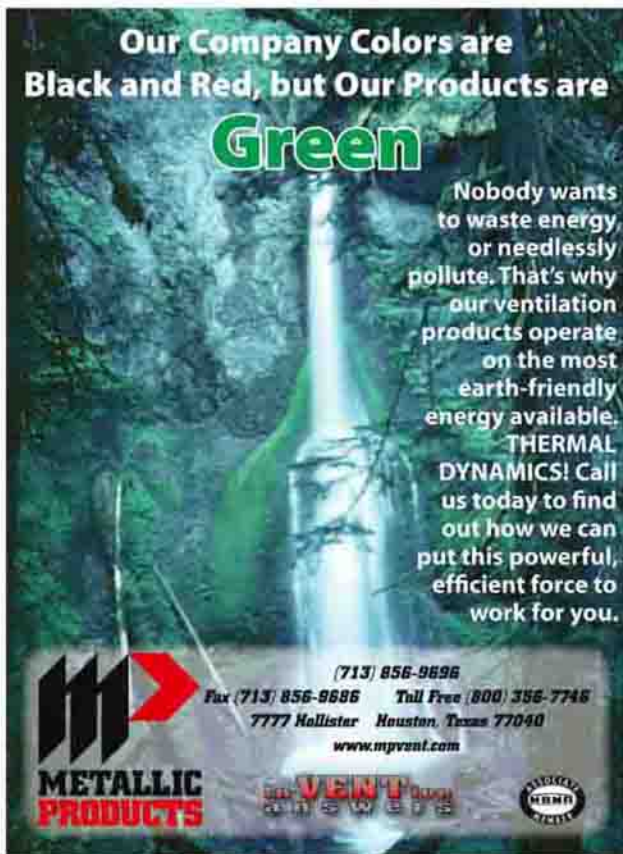
E-mail: info@cor-vent.com • Website: www.cor-a-vent.com

"See and download application details from our website."



Our Company Colors are Black and Red, but Our Products are Green

Nobody wants to waste energy or needlessly pollute. That's why our ventilation products operate on the most earth-friendly energy available: THERMAL DYNAMICS! Call us today to find out how we can put this powerful, efficient force to work for you.



METALLIC PRODUCTS

VENT

(713) 856-9696
 Fax (713) 856-9696 Toll Free (800) 356-7746
 7777 Hollister Houston, Texas 77040
 www.mpvent.com

MEMBER

FREE INFO, CIRCLE NO. 61

SNO GEM Call Toll Free
 the ultimate snow guard **888.766.4367**
www.snogem.com

NEW METAL SNOW GUARDS
 ORIGINAL METAL & HALF-CARAT MODELS

Multi-Faceted snow guards designed to minimize unexpected falling snow and ice and enhance safety!

AVAILABLE IN:
 - COPPER
 - KYNAR 500 (STEEL / ALUMINUM)
 - LEAD COATED COPPER
 - FREEDOM GRAY
 - TCS AND TCS II
 - ZINC



FOR ALL TYPES OF ROOF SYSTEMS.
 -METAL ROOFING -COPPER ROOFS
 -SLATE ROOFS -ASPHALT SHINGLES
 *All metal Sno-Gems available with tabs for easy installation on slate and shingle roofs.

POLYCARBONATE SNOW GUARDS
 AVAILABLE IN CLEAR AND MOLD INJECTED COLORS.



ORIGINAL SNO-GEM SNO-GEM JR.

NEW Patented Pre-Tin Solder Application
 *NO ADDITIONAL SOLDER OR FLUX NEEDED. JUST HEAT TO INSTALL.
 Available in
 Copper - Lead Coated Copper - Freedom Gray - TCS and TCS II - Zinc

FREE INFO, CIRCLE NO. 62

Drexel Metal Corp.
 RoofTopGuard, www.rooftopguard.com
 (888) 321-9630, Sal Catanese



Flexia Corp.
 Tri-Flex 30, www.flexia.ca
 (888) 353-9421, Doug Ryan



InterWrap
 Titanium, www.interwrap.com
 (888) 713-7663, Sandro Dipede



Grace Construction Products
 Ice and Water Shield, www.na.graceconstruction.com
 (800) 354-5414, John Goga



Polyglass USA Inc.
 www.polyglass.net, (800) 222-9782, Gianna Vanchetta



Sharkskin
 www.sharkskin.us, (805) 750-0084, Mark Kirsch



TAMKO
 TW Metal & Tile, www.tamko.com
 (800) 641-4691, Neil Robinson



mm) head roofing nails because the SBS-modified underlayments soften easily with heat and pull away from fasteners. Typical roofing felts easily tear away from fasteners because of wind or heat and shrink away from fasteners after being exposed to moisture. When compared to a properly installed synthetic polyolefin underlayment, SBS-modified underlayments and traditional tar-paper felts are no comparison.

Roof Covering

The type of primary roof covering also will have a great impact on the underlayment; tile roof installations are very abrasive to the roof underlayment; concrete and clay-tile crumbs and debris grinding against the underlayment must be resisted by the underlayment to prevent small holes and tears. Metal roof systems can expose underlayments to extreme heat. As part of the roof system, the proper synthetic roof underlayment correctly installed and protected from direct sunlight after the completed roof installation should last the life of the primary roof covering.

Slope and Obstacles

Roof slope must be considered—underlayments attached to steep slopes see more abuse from foot traffic, installers working over the same roof area for longer time periods because the roof is installed more slowly, and materials and tools being dragged up and down the roof deck. In addition, fall-protection ropes, negotiating scaffolding and other roof obstacles at steep slopes increase the normal amount of roofing materials, tools and debris that are dropped, kicked and slid over the roof underlayment. The steeper the roof slope, the tougher the required underlayment. Most synthetic underlayments will out perform tar paper and SBS-modified underlayments under these conditions.

Make Good Choices

Because an underlayment is an important part of a total roof system, it is important a synthetic roof underlayment last the life of the primary roof covering as should all the components in the roof system. A roof system only is as good as its weakest link, and a roof underlayment is the final and most important component, a safety blanket in protecting a structure from moisture damage. So when choosing the right synthetic polyolefin roof underlayment, remember they are not all the same. Researching each product's features and benefits to determine which synthetic underlayment is best suited for your application is time well spent. And making sure the underlayment is installed correctly will provide an important step toward a value-added long-term roof system. ○

Mark C. Strait works in technical services with Kirsch Building Products LLC, Simi Valley, Calif. He can be reached at mark@sharkskin.us or (805) 750-0084.

STUC-O-FLEX®

Transform metal to stucco

"New options in Exterior Appearance"



- Cost Effective
- Complete ASTM Testing Program
- Comprehensive Warranty
- In-Plant or Field Application
- Unlimited Textures & Color
- 100 million square feet of History

Stuc-O-Flex International, Inc.
1-800-305-1045

www.stucoflex.com



FREE INFO. CIRCLE NO. 64

SHARKSKIN™

Ultra The Ultimate Roof Underlayment

Engineered to exceed industry standards for long term moisture protection!



Kirsch Building Products LLC
Tel: (805) 750-0084
Fax: (805) 526-1116
kirsch@sharkskin.us
www.sharkskin.us

High Tensile Strength
Will not blow off

Installs with 3/8" Roofing Nails
Does not require plastic caps

Slip-Resistant
Even in wet or dusty conditions

Light Weight
Easy to lift, load, and work with

12 Month UV Exposure Rating

Will Not Rot
Will not rot, dry out or become brittle

No Expansion/Contraction
Material remains stable

Will Not Wrinkle
Does not absorb moisture

Will Not Scar or Melt
NO Sticky Mess
Withstands high temperatures

Eliminates Slip Sheet
Serves as a slip sheet beneath metal roofs

1464 Madera St., Suite 387
Simi Valley, CA 93065

FREE INFO. CIRCLE NO. 63