

DUPONT™ TYVEK® VS. TYPAR®

DuPont™ Tyvek® Water-Resistive Barriers (WRBs) provide superior performance and durability

DuPont™ Tyvek® Water-Resistive Barriers (WRBs) give you the durability and performance needed to build more comfortable and energy-efficient homes. Trusted by quality building professionals everywhere, DuPont™ Tyvek® Water-Resistive Barriers, part of the complete DuPont™ Weatherization Systems offering, deliver superior performance compared to Typar® and film laminate or coated WRBs as further described in this document.

CHOOSING THE RIGHT WRB

The primary purpose of a house wrap is to prevent air penetration and water damage in the wall assemblies of the homes you build. A good WRB must perform four equally important functions:

1. It **MUST function as an air barrier** to help prevent drafts.
2. It **MUST provide bulk water resistance** to help prevent water that gets behind the exterior cladding from entering into the wall cavity.
3. It **MUST offer moderate-to-high vapor permeability to allow any water that does enter the wall cavity to evaporate.**
4. It **MUST be durable enough to withstand job-site challenges during installation.**

In order to accomplish all of this, a product needs to provide the proper balance of air and water resistance and vapor permeability, and also be strong enough to withstand the rigors of the construction process and perform after installation.



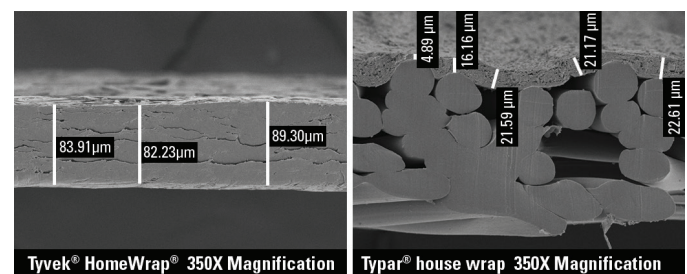
DuPont™ Tyvek® HomeWrap® offers the optimal balance of properties to satisfy all four requirements of a WRB.

DUPONT™ TYVEK® HOMEWRAP® – ENGINEERED FOR SUPERIOR PERFORMANCE

DuPont created Tyvek® HomeWrap® to have the optimum balance of properties for superior performance against the elements AND the competition. Simply put, Tyvek® outperforms Typar® house wrap due to a fundamental difference in the way the Tyvek® WRBs are made.

Tyvek® HomeWrap® is a uniquely engineered product made by spinning extremely fine high-density polyethylene (HDPE) fibers that are fused together to form an extremely tough and uniform structure which is continuous throughout the WRB. The fiber structure creates microscopic pores that resist bulk water and air penetration, while allowing moisture vapor to pass through. The performance of DuPont™ Tyvek® HomeWrap® exceeds the International Building Code and the International Residential Code requirements as a water-resistive barrier and meets the air barrier requirements of ICC-ES AC-308 and the ASTM E1677 Standard Specification for a Type I air barrier.

Typar® products are comprised of a thin film coating on a polypropylene fiber mesh. The polypropylene backing consists of a coarse mesh, similar to that of a landscape fabric, which is necessary to provide support for the thin film layer. This mesh is tear resistant but offers no protection for water and air penetration. The thin coating or functional layer is added so minimum water and air resistance standards are met.



The electron micrographs above show that DuPont™ Tyvek® HomeWrap® (left) is uniquely engineered so its functionality extends the full thickness of the product. Typar® house wraps (right) consist of a thin, functional film coating on a structural mesh.



Also, as you can see in the electron micrograph image of Typar®, the thickness of the functional layer is not a consistent depth. In this particular example, the thickness varied from 4.8 to 22.6 microns – which is less than half the thickness of a human hair. The thinnest areas tend to occur above the protruding fibers, making these areas even more susceptible to damage.

By comparison, the entire thickness of Tyvek® HomeWrap® functions as an air barrier and provides water resistance and is 4 to 20 times the thickness of the functional layer of Typar® depending on the point at which the functional layer of Typar® is measured.

DURABILITY MATTERS: THE FRAGILE FUNCTIONAL LAYER OF TYPAR® IS SUSCEPTIBLE TO DAMAGE

To perform as a WRB, Typar® house wrap relies on a thin layer of film. This functional layer is not an inherently durable material making it prone to damage from the rigors of the job site. In the real world, the film's integrity can be easily compromised through tearing, abrasion, and/or delamination from the support mesh by routine handling both during and after installation.

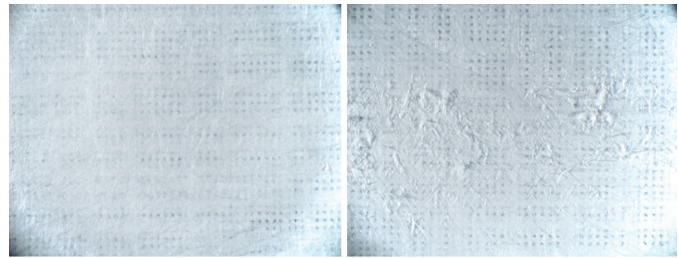
Once damaged, the film layer no longer provides resistance to air and water—which are the properties you rely upon to protect the homes you build.

IN THE LAB, OR ON THE JOB, TYPAR® DOESN'T HOLD UP

To perform as intended, a WRB must first stand up to the normal rigors of a jobsite and endure common occurrences such as moving ladders, wrapping around corners, installing windows and siding, etc. Even the slightest abrasion, stretching or tearing during any of these jobsite activities can damage the thin functional layer of Typar®.

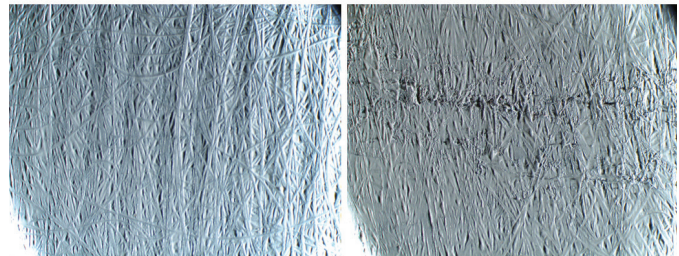
Abrasion testing, conducted at the request of DuPont, was used to simulate real world exposure of both Tyvek® and Typar® to the rigors of a typical construction site. Next, Tyvek® and Typar® were tested for air and water resistance. Sample abrasion was conducted per ASTM D3884 on commercially available Tyvek® HomeWrap® and Typar® house wrap.

The following photographs show samples of both Tyvek® HomeWrap® and Typar® before and after only 1 cycle of abrasion which is what you might expect to see after dragging a tool belt across the surface or fitting wood siding into place. After testing, both products showed signs of surface damage as shown in the magnified images that follow.



Tyvek® HomeWrap® Before abrasion testing 8X Magnification

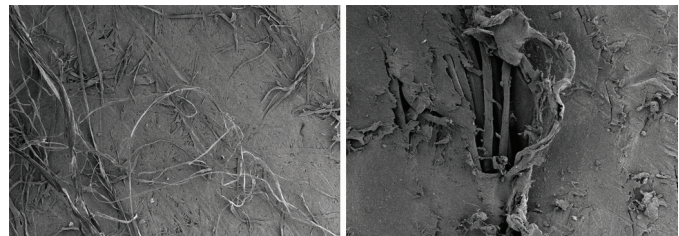
Tyvek® HomeWrap® After 1 abrasion cycle 8X Magnification



Typar® house wrap Before abrasion testing 8X Magnification

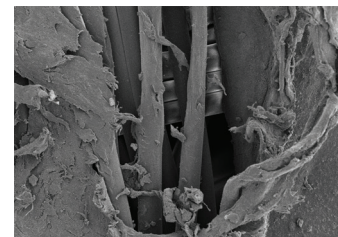
Typar® house wrap After 1 abrasion cycle 8X Magnification

Further examination using electron microscopy shows that although small fibers are pulled from the surface of Tyvek® HomeWrap®, the material underneath remains intact. The Typar® house wrap sample developed holes in the fragile functional layer which compromises the product's ability to hold out air and water.



Tyvek® HomeWrap® After 1 abrasion cycle 75X Magnification

Typar® house wrap After 1 abrasion cycle 75X Magnification

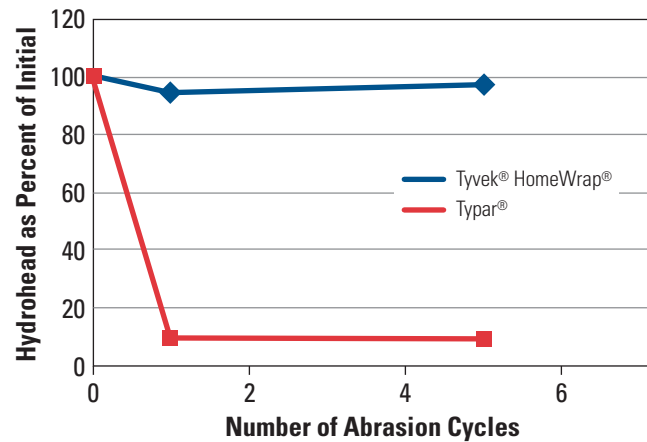


Viewed at 200X Magnification, holes in the functional layer of Typar® house wrap appear after just one abrasion cycle, exposing the mesh backing.

THE IMPORTANCE OF ABRASION RESISTANCE

Can minimal surface damage and a few microscopic holes really affect a product's performance? To find out, both products were tested for air and water resistance after abrasion exposure. All testing was performed using commercially available Tyvek® HomeWrap® and Typar® house wrap. The results are clear. Typar® house wrap lost virtually all of its measurable water resistance after only 1 abrasion cycle. If a WRB cannot effectively hold out water, it will not be able to hold out air. Therefore, minimal abrasion to Typar® would result in loss of air barrier properties.

WATER RESISTANCE AFTER ABRASION (AATCC 127)



After as little as 1 cycle, Typar® lost most of its effective water resistance. The water resistance of Tyvek® was not significantly affected after 5 cycles.

Because Typar® relies on this fragile film, it is questionable whether it will withstand the rigors of field installation and site exposure. Film damage has been noted with as little as simple routine handling of the product.

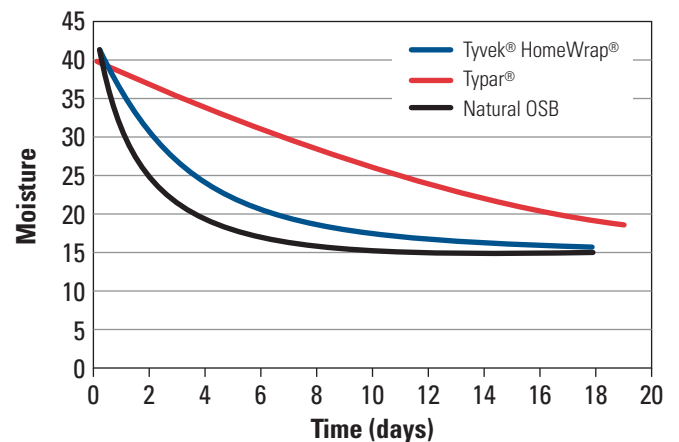
TYPAR® IS NOT A HIGH VAPOR PERMEABILITY WRB INCREASING POTENTIAL FOR DEVELOPMENT OF MOLD, MILDEW, AND ROT

The low vapor permeability of Typar® house wrap compared to Tyvek® HomeWrap® means that it takes longer for a wall to dry, increasing the risk of water-related issues and potential for the development of mold, mildew and rot.

The DuPont Building Science Technical Bulletin *Understanding High Perm vs. Low Perm* (K-01472) summarizes a study which evaluates the drying rate of saturated OSB samples inside a sealed envelope made of high and low perm WRBs. The envelopes were placed in different temperature & humidity controlled environments to simulate variable climate conditions.

The drying behavior of the OSB approaches the natural drying rate when moderate to high vapor permeable WRBs such as Tyvek® HomeWrap® are used (>20 perms). Lower perm products (<20 perms) such as Typar® house wrap reduce the natural drying capacity of the OSB. This study was conducted when the perm rating of Typar® house wrap was 13.7 and is included as the red line in the figure below. Current literature indicates the perm rating has been reduced to 12 which would further reduce the drying rate. The drying curve of Tyvek® HomeWrap® closely resembles the drying curve of the natural OSB.

OSB DRYING CURVES (85°F / 80% RH)



This graph illustrates the ability of OSB to dry when covered with Tyvek® or Typar®. Tyvek® allows the OSB to dry significantly faster than Typar®.

THE TRUTH ABOUT VAPOR PERMEABILITY IN HIGH HUMIDITY ENVIRONMENTS

Several manufacturers of low perm WRB products, including Fiberweb, the manufacturer of Typar® house wrap, have claimed that low vapor permeability is needed in hot/humid climates and that products with high permeability ratings are not suitable for high humidity environments, but that's just not the case. This claim is based on the perception that although high vapor permeability maximizes wall drying, permeability should be balanced to minimize potential moisture accumulation due to inward vapor drive in hot-humid climates.

In research conducted by DuPont—and detailed in the Building Science Bulletin titled *The truth about vapor permeability in high humidity environments* (K-26358)—WRB permeability had no significant effect on moisture accumulation in actual test walls from inward vapor drive. And, counter to the claims made by manufacturers in their literature, **no optimum vapor permeability range was observed to reduce the potential for solar driven moisture.**



The miracles of science™

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CONCLUSION

DuPont has the technology to engineer each WRB property of Tyvek® HomeWrap® for optimum performance. As a result, Tyvek® HomeWrap® offers high vapor permeability without sacrificing resistance to air and bulk water penetration. Also, the functionality of the entire thickness ensures the product will perform after exposure to the rigors of the jobsite and installation. Typar®, on the other hand, relies on a thin functional layer which is susceptible to damage that can limit the products performance as an effective WRB. Once again, Tyvek® HomeWrap® offers the best balance of properties to help you build more durable, energy efficient structures.

FOR MORE INFORMATION

For more information, please call 1-800-44-Tyvek or visit www.weatherization.tyvek.com

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THE DUPONT™ BUILDING KNOWLEDGE CENTER

The DuPont Building Knowledge Center is where DuPont building scientists and construction professionals evaluate solutions and collaborate on new ideas that will lead to building practices that will yield more energy efficient and durable structures. www.buildingknowledge.dupont.com

DUPONT™ TYVEK® SPECIALIST NETWORK

DuPont™ Tyvek® WRBs are backed by more than 25 years of innovative building science and a national group of highly trained field representatives who are available to assist you with your installations of DuPont™ Tyvek® weatherization products. From the latest updates on building codes, to keeping up with current trends and challenges, your local DuPont™ Tyvek® Specialist can provide on-site consulting and training on DuPont products in order to help you make sure the job gets done right.

DUPONT™ TYVEK® CERTIFIED INSTALLERS

The DuPont™ Tyvek® Certified Installer Program is one more way to put the building science expertise of DuPont right at your fingertips. Your Certified Installer provides trained installation services for DuPont™ Tyvek® weatherization products to help seal the building envelope.

10-YEAR LIMITED WARRANTY

The complete line of DuPont™ Tyvek® WRBs, tapes, flashings and sealants integrate seamlessly to help you seal the building envelope so you can rest assured that the homes you build are more energy efficient and better protected. To back it up, DuPont also offers a 10-Year Limited Warranty on certain products. Please refer to www.weatherization.tyvek.com for warranty details.

CONTINUING EDUCATION UNITS

To help you stay current on building practices and specifications, your local DuPont™ Tyvek® Specialist offers AIA and CES learning units, as well as Building Science Seminars.

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