



6 Reasons

To Specify a VI Barrier Offering
the Highest Level of Chemical
Resistance

Why Choose a Vapor Intrusion Barrier With the Highest Chemical Resistance on the Market?

For properties where there is underlying contamination that cannot be removed and represents a serious risk to human health, it is important to have a solution that can effectively mitigate that risk and provide both building occupants and owners assurances that they are shielded from physical and financial harm.

TerraShield offers a higher level of protection compared to any vapor barrier system available today. With industry-leading standards for installation along with robust warranty options, there is simply no better option on the market for industrial, commercial, or residential vapor intrusion mitigation.

TerraShield is a significant step forward for vapor intrusion barriers. Employing a metallized film technology in combination with a versatile spray-applied nitrile core, TerraShield provides superior chemical resistance over any existing vapor barrier currently on the market. It is the ideal vapor mitigation solution for residential, industrial, and commercial developments with volatile contaminant impacts that represent significant health hazards and economic liabilities.



6 Reasons to Consider TerraShield Vapor Barrier to Protect Your Property Investment

01

Demand Unparalleled Chemical Resistance

Years of Research and Lab Testing Result in the Highest Level of Chemical Resistance Available

Years of research and development have resulted in a vapor barrier that leads the industry in chemical resistance. TerraShield is composed of metallized film technology coupled with a highly chemically resistant spray-applied, asphalt and nitrile-based core material.

Lab results indicate that the base layer for TerraShield offers 100x more protection against trichloroethylene (TCE) vapors, a solvent commonly found on former industrial sites, compared to a high-density polyethylene (HDPE) base layer. Studies also showed that the spray-applied nitrile core offers up to 10x improved performance in TCE vapor resistance versus a comparable styrene butadiene-based core.

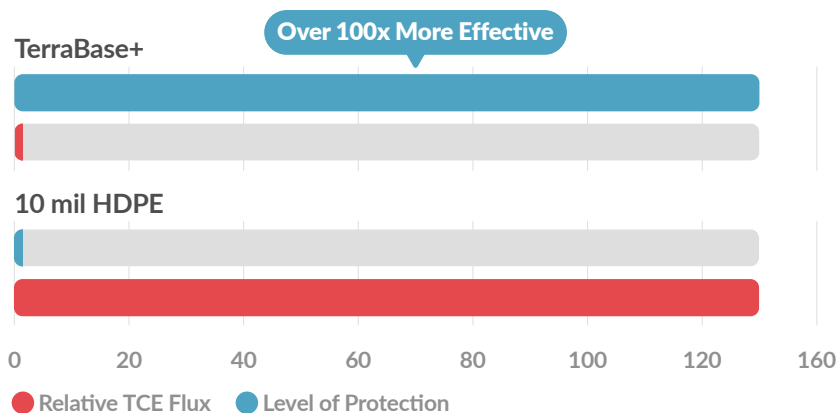
“Laboratory results indicate that the base layer for TerraShield offers 100x more protection...”

Using the spray-applied asphalt to cover the base layer, including seams, penetrations, and terminations, provides orders of magnitude improvement in protection when compared to tape-based or heat-welded systems and makes TerraShield virtually impenetrable to contaminants typically found at sites with environmental impacts (i.e. perchloroethylene, benzene, methane).

Between the metallized film and the versatile spray-applied core, the level of chemical resistance that TerraShield offers is unmatched by any other product currently on the market.



Accelerated comparison showing the relative TCE flux through the vapor barrier base components. TerraBase+ demonstrated 147x lower TCE flux vs. 10 mil HDPE.





02 Choose a Solution that is Lab-Tested to Perform

Lab Tested and Proven Effective Against TCE

When choosing a vapor barrier, it is important to ensure that it has excellent chemical resistance as that is one of the primary characteristics that will determine its efficacy. A vapor barrier with low chemical resistance will simply allow vapors to pass through into occupied spaces, potentially causing harm to any occupants who are exposed. Each component of a vapor barrier will contribute to its overall effectiveness. Therefore, considering the design, construction materials, and results of lab testing to evaluate its ability to protect human health against harmful vapors is paramount.

For example, TerraBase+, the dual-metallized base layer of TerraShield, was tested against a 10 mil HDPE barrier to determine relative chemical resistance. A vapor-diffusion testing apparatus comprised of two separate glass chambers in a vertical configuration was used for this experiment.

The bottom chamber contained water and TCE at equilibrium, with the concentration of TCE held at either a constant 10 mg/L or 100 mg/L (corresponding to 700 ppmV and 7,000 ppmV respectively). This is higher than what would normally be found underneath a building but it allowed for the experiment to be completed in a short period of time while offering an understanding of relative chemical resistance between tested materials.

“Comparing the relative TCE flux through the two barriers indicated that over 100x less TCE diffused through the TerraBase+ Layer...”



The top chamber was filled only with air but continuous airflow (2.5 mL/min) was maintained in the chamber to mimic the activity of an HVAC unit within an inhabited building.

The material to be tested (TerraBase+ or HDPE) was secured between the bottom and top chambers, separating the chambers so that the only path for TCE vapors was to diffuse through the barrier. Comparing the relative TCE flux through the two barriers indicated that over 100 times less TCE diffused through the TerraBase+ layer as compared to the HDPE layer. Similar testing was done on the nitrile-modified asphalt (Nitra-Core) and demonstrated a 10-fold increase in chemical resistance over other spray-applied asphalts.

Incorporating new barrier materials and innovative design, TerraShield has proven to be very effective at resisting diffusion of TCE, even at concentrations far above those normally encountered in buildings. The individual components of TerraShield work together to ensure that it is not only effective but also represents a significant leap forward in performance relative to alternative vapor barrier systems.

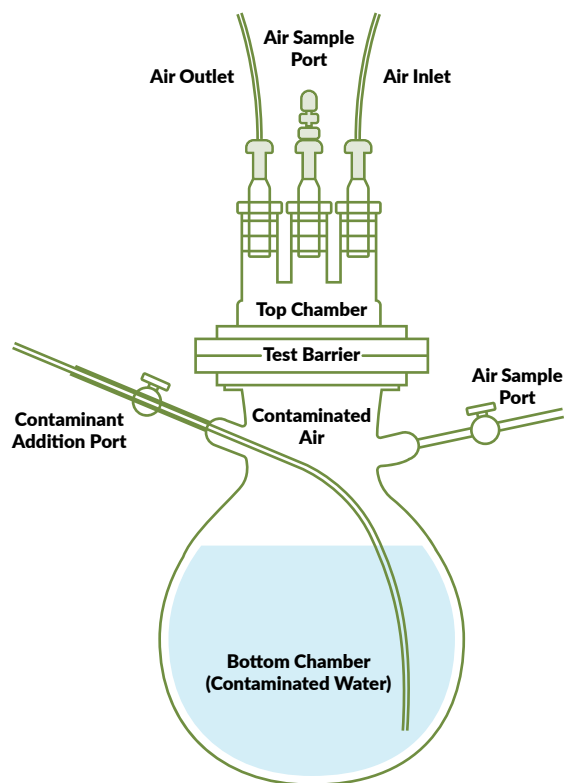


Figure shown represents the vapor barrier testing apparatus used in evaluating chemical resistance



03

Incorporates Venting Technology

Cost-Effective Venting System Makes a Viable Alternative to Perforated Piping

Beyond just creating a barrier that is impermeable to vapors, TerraShield also incorporates TerraVent, a low-profile, trenchless, flexible, sub-slab vapor collection system in lieu of perforated piping that can passively or actively vent vapors. It consists of a heavy duty 3-dimensional, high flow, polypropylene dimpled core.

The core is then wrapped and bonded with a non-woven geotextile to prevent the intrusion of soil, sand, or gravel.

TerraVent diverts vapors and prevents them from entering occupied spaces, providing an additional layer of protection against potential health hazards and further reducing risk.



04 A Robust Vapor Barrier to Withstand Construction

Layers of Protection Makes TerraShield Robust Enough for Any Construction Site

TerraShield is constructed of several layers, each adding to the physical robustness of the overall system. Composed of a metallized film laminated to a geotextile, a co-polymer polyethylene, and a tear resistant PET reinforced grid structure that provides superior durability, TerraShield is designed to withstand the stresses of a typical construction site.

This means, unlike other available vapor barrier systems, TerraShield is less likely to incur damage during construction avoiding

time-consuming repair work and maintaining the integrity of the system. This will serve to reduce construction time and associated costs. Additionally, in the long run, the building will be kept secure against the intrusion of harmful vapors by resisting future damage.

"Nitra-Core offers up to 10x the chemical resistance and is puncture resistant..."



05 Installation Done Right: Certified by Experts

Make Sure to Choose a Certified Applicator

A vapor barrier is only as effective as the quality of its installation. If installed incorrectly, a vapor barrier will likely fail, regardless of the underlying technology. Because of this, Land Science invests heavily in their applicators. All TerraShield contractors must pass a rigorous applicator certification and training program to ensure their work meets the demanding installation standards. There is a continuing education program available for all applicators to ensure they are up to date on the best practices for installation and inspection. TerraShield components are shipped to and installed on site. Final assembly on-site ensures tight seals between seams, around

penetrations, and to terminations. Once installed, applicators perform a full smoke test beneath the barrier to confirm that all seals are secure and that the system will prevent vapor intrusion to the best of its ability. Any leaks are immediately repaired and testing is repeated until the system is shown to be completely secure.

Certified applicators are located throughout North America who can install TerraShield quickly and efficiently.

“Trust a certified applicator to install your barrier to exacting standards.”



06 Choose a VI System with an Industry Leading Warranty

The World's Leading Vapor Barrier System Warranty

Land Science offers industry leading warranty options for its vapor barriers, including material and system warranties with durations from a 1-30 year material and system warranty. System warranties require site specific evaluations by Land Science prior to installation to determine if a system warranty can be offered. So you can rest assured that your investment in vapor intrusion mitigation is protected.

"Land Science offers an industry leading warranty covering installations for up to 30 years."



TerraShield System Overview

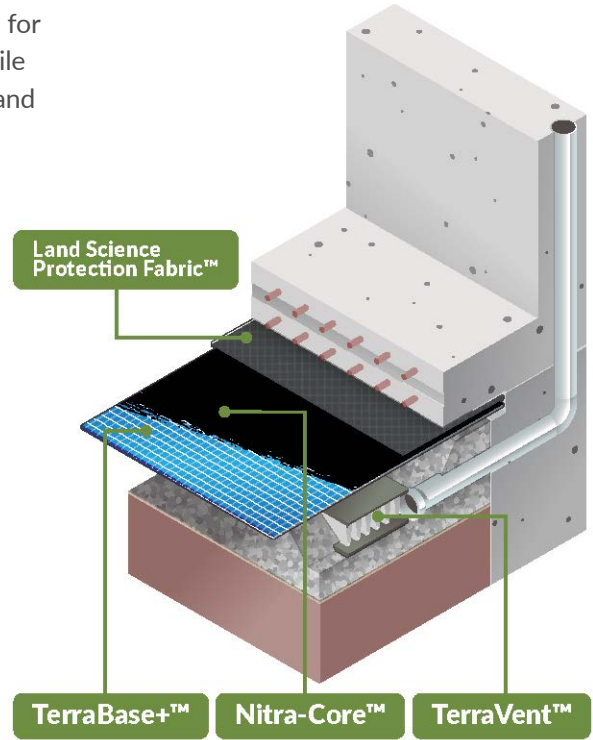
TerraShield® is a significant step forward for VI barriers. Employing an innovative dual-metalized film technology, TerraShield provides superior chemical resistance over any existing vapor barrier currently on the market. It is the ideal vapor mitigation solution for residential, industrial, and commercial developments with volatile contaminant impacts that represent significant health hazards and economic liabilities.



Technology

A Multi-Layer Base With Innovative Metalized Film Technology

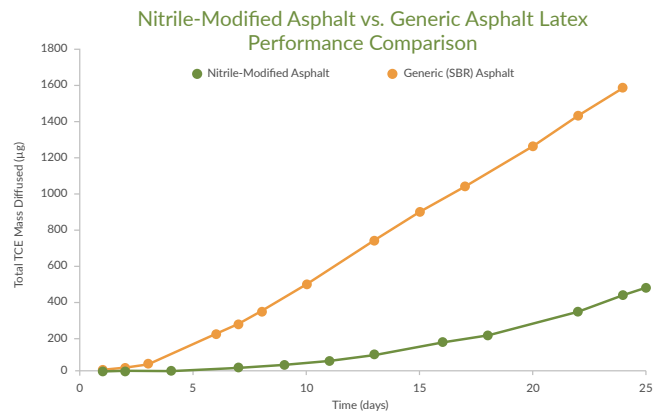
The Land Science research and development team of scientists have invested years in developing the TerraShield vapor barrier system and advancing the materials commonly used in composite spray-applied barriers. The base layer of the system now provides over 100x greater chemical resistance versus a traditional HDPE sheet good, due to the innovative combination of aluminum metallized film and polyethylene.



Nitrile-Advanced Asphalt Latex Technology

Land Science researchers have developed a breakthrough technology which incorporates nitrile, a material known for enhanced resistivity to contaminant permeation, into the spray applied core formulation. The resulting Nitrile-Advanced asphalt latex core component offers an improvement of up to 10x in chemical resistivity compared to generic asphalt-latex spray applied barriers.¹

1. U.S. and international patents pending.



TCE diffusion rates in Nitrile-Advanced Asphalt Latex barrier systems vs those utilizing Generic (SBR) Asphalt.

Nitrile-Advanced Asphalt Latex Compared to Generic SBR Asphalt Latex

Nitrile-Advanced Asphalt Latex

- ✓ Lab-proven to provide 10x higher chemical resistance
- ✓ Easier and faster to apply
- ✓ Equipment requires only soap and water to clean

Generic SBR Asphalt Latex

- ✗ Higher permeability increases risk of contaminant sorption
- ✗ Longer, slower application time
- ✗ Equipment requires petroleum-based solvents to clean



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