Aluminum Metallized Vapor Barrier Questions and Answers

Aluminum Corrosion is Not a Concern

When considering the selection of a contaminant vapor barrier, the chemical resistance and protection offered by the Land Science aluminum-polyolefin composite sheeting is unparalleled. Because it contains aluminum, questions arise from time to time relating to the potential for the aluminum metal to deteriorate, once installed. This Q&A Resource addresses the key issues related to this topic. If you have additional questions, please don't hesitate to contact Land Science directly.

Once installed can the aluminum begin to corrode?

No, the aluminum will not corrode once the barrier is properly installed. The aluminum layer is protected between two layers of polyethylene, a configuration that has been demonstrated to protect aluminum from corrosion.[i] During installation, any cut edges with exposed aluminum are sealed during the seaming and termination steps with Nitrile-advanced asphalt spray. This eliminates the potential for exposure to oxygen and water and thus the potential for any deterioration.

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If concrete is poured directly onto the barrier, will the concrete damage the aluminum?

No. The aluminum layer is protected by a polyethylene layer and in most cases an additional upper protective layer such as a geotextile is also installed. Any terminations or seams are totally sealed in nitrile-advanced asphalt spray protecting any aluminum edge from direct contact with concrete, oxygen and moisture.

What if the barrier is damaged during installation or construction activities?

If for some reason the barrier is torn or punctured during installation or construction, it should always be repaired and is a requirement of the Land Science installation process. If left unrepaired the hole offers a direct route of contaminant gas passage and defeats the purpose of having the barrier. Repairs are easily carried out by spraying the hole and surrounding area with nitrile-advanced asphalt spray, patching with a small piece of the aluminized polyolefin sheet, and finally covering the patch again with another layer of nitrile-advanced asphalt spray.

If a tear in the barrier is left unrepaired and exposed to oxygen will the aluminum deteriorate?

No, it will not deteriorate. If for some reason a tear is left unrepaired, the exposed aluminum edge will contact atmospheric oxygen causing a process referred to as atmospheric corrosion or passivation. This is the spontaneous formation of a thin, protective aluminum oxide film which limits the potential for further corrosion. This is the whitish color commonly seen on aluminum boats exposed to the elements.

The actual chemical reaction is expressed as follows: $4\ Al + 3\ O_2 = 2\ Al_2O_3$

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What if a tear in the barrier is left unrepaired and continuously exposed to moisture and oxygen, will the aluminum deteriorate?

No, it will not deteriorate. If for some reason a tear is left unrepaired and the exposed aluminum edge contacts moisture and oxygen the aluminum will begin to passivate, forming the thin protective aluminum oxide layer. Aluminum oxide film has been shown to be stable in pH values between 4.0 and 8.5[ii]. The only known case of any deterioration is where bare aluminum is left in contact with very high pH for extended periods of time. While high pH exposure is expected from the alkaline water in concrete when it is poured on top of a barrier, the inclusion of an upper protective layer, even just a geotextile, has been demonstrated to completely protect an exposed tear in a barrier from corrosion in that scenario.[ii]

Will the calcium chloride catalyst used during the application of the nitrile-advanced asphalt spray induce corrosion of the aluminum?

No. While electrolyte solutions can accelerate corrosion of metals by oxygen and water or even by other metals in a process referred to as galvanic corrosion, these types of corrosion are inhibited by simply coating the metal surface with an insulative material. In the case of the Land Science's aluminum-polyolefin composite barriers, the aluminum is encapsulated in insulative polymer material and all edges are coated with nitrile-advanced asphalt spray during installation. These coatings act as excellent insulation against any type of corrosion. Furthermore the chloride solution applied as the catalyst during the spray application is almost immediately ejected from the nitrile-advanced asphalt layer. Further contact of any salt solution is inhibited as the hydrophobic nitrile-advanced asphalt layer is very water resistant and serves to protect the aluminum from any contact with moisture or electrolytes eliminating the risk of any corrosion.

References:

[i] *Lucas, J. and S. Wilson. 2019. Corrosion and Puncture Resistance of Aluminum Foil Gas Membranes Beneath Concrete Slabs. Technical Note, Geosynthetics international 1072-6349.*

[ii] *Reflective Insulation Manufacturers Association International, 2008, Technical Bulletin #105.*

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