

Substrate Imperfections: How They Impact Performance



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In a perfect world, roof decks in the field would always match the quality of the roof decks used in wind uplift testing labs. Unfortunately, that kind of controlled quality only exists in a lab. Substrate imperfections are commonplace on real-world applications due to natural movement and deterioration over time. At the time of reroofing, these imperfections can pose real challenges related to the installation of the insulation system and roof membrane.

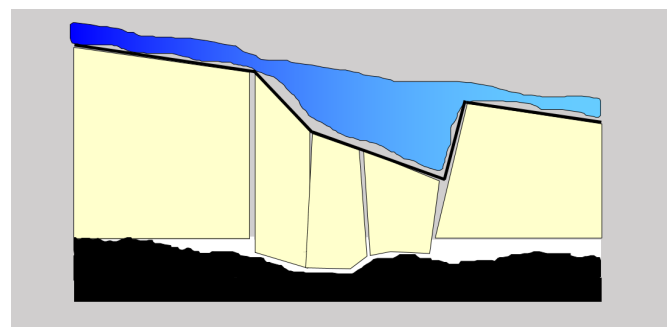
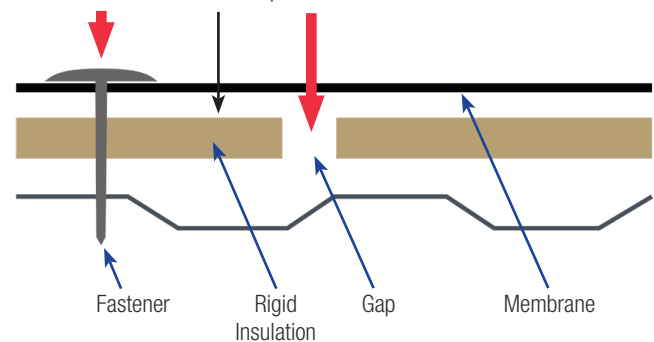
Impacts on Roof Performance

With initial higher R-values per inch than any other types of insulation and ease of installation, the most common roof insulation specified today is Polyisocyanurate (Rigid). This system selection is based on the upfront benefits rather than long term performance considerations.

Rigid insulation, by nature, cannot conform to the malformations in the deck and creates air space and gaps. This could affect performance in the following ways:

- Decreasing overall bond to the deck.
- Allowing more heat flow and decreases actual R-value immediately.
- Increasing susceptibility to damage from foot traffic and wind uplift.
- Increasing the risk for premature roof deterioration due to membrane stress.

Parallel Heat Flow Concept



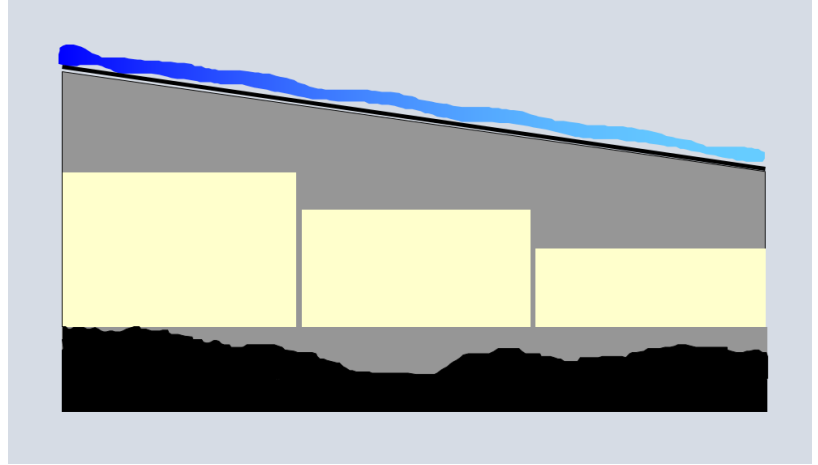
Potential damage to rigid insulation installed over uneven substrates.

Lightweight Insulating Concrete is designed to accommodate substrate imperfections.

Dimensionally Flush Roof Decks

Lightweight Insulating Concrete (LWIC) is designed to accommodate substrate imperfections. LWIC fills in voids and creates dimensionally flush decks. In addition, the reusable nature of LWIC systems could reduce future reroofing costs, and provide R-value stability while directing less waste to our landfills.

Siplast LWIC Systems offer aggregate and cellular design mixes; the mix design selection is not dependent on a specific malformation or substrate condition to be effective. Rather, the mix design should be selected to meet other project demands such as membrane attachment method or low flashing heights.



The LWIC system consists of:

- A slurry coat or bottom pour to fill in malformations.
- Expanded Polystyrene (EPS) board embedded into the slurry coat.
- Top coat of lightweight concrete that is 1 to 2 inches in thickness.

Once fully installed, the system is a monolithic roof insulation deck and creates an ideal substrate that maintains a steady R-value over time, and can extend the life of the membrane.¹



Slurry Coat or Bottom Pour



Embedding EPS Board



Top Coat

1. Siplast, [Mass Effect](#), Substrate Influences on Modified Bitumen Roof Membrane Longevity

Designing for Long Term Performance

Roof systems must be able to withstand an increasing variety of environmental exposures and weather events. Lightweight Insulating Concrete is a reusable insulation system that stands out as a durable solution that can solve many of the challenges posed by substrate imperfections as well as help roof systems perform better long-term.



More About the Author



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Peter Gross has over 18 years experience in the roofing industry, both on the contracting and manufacturing sides of the business. Peter holds a Construction Documents Technology (CDT) certification from the Construction Specifications Institute. He has also served as the past president of the Carolinas Chapter of IIBEC and served as a board member of the Gulf Coast Chapter of IIBEC.