Siplast® Lightweight Insulating Concrete FAQ

Table of Contents

About Lightweight Insulating Concrete (LWIC)

1. What is lightweight insulating concrete (LWIC)?

Siplast Lightweight Insulating Concrete Systems combine lightweight concrete and expanded polystyrene foam. They provide a smooth, monolithic surface ideal for roofing, and help to prolong the life of the roof membrane by lowering membrane temperatures. These systems address roof design goals such as slope-to-drain, moisture resistance, compressive strength, stability, and mechanical fastening. They also meet regulatory requirements for Florida Building Code, Factory Mutual, UL, CSA and many others. Contact Siplast Design & Technical Service Team at 855-861-6460 or **designservices@siplast.com.**

One significant advantage is their potential reusability. Siplast Lightweight Insulating Concrete is highly resistant to moisture damage, allowing for reroofing in most cases. This can help reduce the life cycle cost of the roof system and minimize solid waste.

2. What are the types of LWIC and how are they used?

Siplast Lightweight Insulating Concrete is available in four mix designs: ZIC, NVS, Insulcel, and Zonocel. The four designs represent a range of compressive strengths, allowing a choice of system based on substrate and project circumstances. Each design encapsulates Insulperm Insulation Board in insulating concrete. This provides fire protection, prevents air infiltration, and create a solid, monolithic insulated deck.

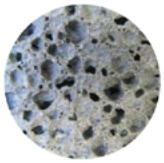
Return to TOC

TYPES OF LWIC

Aggregate-Based
Lightweight Insulating Concrete

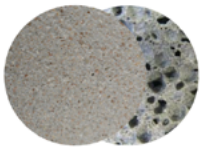
Aggregate system's lightweight properties stem from the addition of lightweight aggregates (vermiculite) added to the cement mixture.

Cellular-Based
Lightweight Insulating Concrete



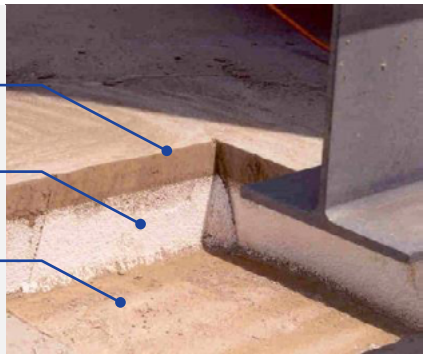
Cellular systems derive their lightweight properties from air cells formed in the concrete matrix.

Aggregate-Cellular Hybrid
Lightweight Insulating Concrete



A variety of mixes and a wide range of densities are possible.

3. What does a cross section of LWIC look like?



- A slurry coat or bottom pour of lightweight concrete to fill in malformations.
- Insulperm, an expanded polystyrene (EPS) board is embedded into the slurry coat and typically left to dry overnight.
- Lightweight concrete top coat of 1 to 2 inches in thickness is poured after the slurry coat is completely dry.

4. What happens if it rains while the contractor is installing the LWIC system?

In comparison to polyisocyanurate insulation boards where rain may lead to a tear out due to board damage, decreased thermal resistance, and potential mold growth, the remediation required for a LWIC system is less complicated.

- If rain occurs while the contractor is placing the boards in the slurry, the system is typically unaffected and can be fixed or touched up by the LWIC applicator once the rain subsides.
- During the installation of the top coat, if it starts raining, there is a possibility of small pitting occurring. However, this generally does not impact the roof's attachment, whether it's a nailed base sheet or a single-ply membrane.
- In the event of a heavy rain, there might be some runoff of the top coat. This can be addressed and repaired by the LWIC applicator on the following day.
- Contact your local field tech representative with questions.

Return to TOC

5. How is Siplast LWIC different from Celcore, Elastizel and others?

Siplast is the only company offering aggregate systems like NVS and ZIC. While the market for Insucel is highly competitive, with players like Celcore, Elastizel, and MerylCrete, Siplast distinguishes itself with the Insulcel System. Our system combines Siplast's Cellular Foam and Insulperm (EPS Board), providing guarantee coverage for these materials together as a cohesive system that not only facilitates re-roofing but also maintains exceptional long-term thermal resistance.

Our commitment to quality control extends beyond the foam itself. We meticulously inspect and support the Holey board, offer comprehensive field inspections, and issue guarantees directly through our company, eliminating the need for separate entities and separate warranty or guarantee documents.

Moreover, Siplast stands as the only roof manufacturer that provides all the essential components: the board, aggregate, and foam. This comprehensive offering allows us to provide you with a true Roof System Guarantee. While others may offer joint agreements with LWIC manufacturers, Siplast can offer a complete solution.

6. What is the difference between LWIC and Structural Lightweight Concrete?

The two resources below can help you understand the key differences between the materials and their uses.

- NRCA Tech Doc Structural Lightweight Concrete
- Siplast Structural Lightweight Concrete as Substrate

7. Why use LWIC versus traditional insulation like ISO?

LWIC can reduce the need for insulation replacement during reroof cycles. This not only saves you time,effort and expense of replacing your insulation every time you replace your roof, but it can also help reduce the waste from your project that needs to be disposed of in a landfill. All while potentially extending the life of your roofing membrane by lowering membrane temperatures. A win-win scenario!

Unlike ISO insulation, which demands perfection in substrate surfaces, LWIC application is not affected by superficial imperfections like uneven substrates. With LWIC, an additional slurry coat smooths out any irregularities, providing a smoother surface of the insulation system.

Refer to our white paper, **Substrate Imperfections: How They Impact Performance.**

8. What is the Insulcel RT System and how does it work?

The Insulcel RT system, developed approximately two decades ago, helped revolutionize the wind uplift capabilities of modified bitumen systems in the Florida and Puerto Rico markets. One of the remarkable advantages of this system is its fastener-free design. Instead of relying on traditional methods of attachment like fasteners, it leverages asphaltic pellets that bond directly to the surface.

Return to TOC

In this system, an asphalt pellet is mechanically dispersed onto the uncured surface. Once the system cures, the pellets are heated with a torch, causing them to expand and enhance the bond of the venting base ply and attaching to the Insulcel by acting as mini-fasteners. This process eliminates the need for conventional fasteners, simplifying the installation process.

Insulcel RT System can be applied over various substrates such as slotted and non-slotted metal decks, structural concrete, vapor barriers, or properly prepared existing BUR roofs. This flexibility allows for greater adaptability and wider application possibilities.

9. Can LWIC be installed over an existing roof system?

LWIC systems like NVS, Insulcel, or Insulcel RT can be installed over pre-existing asphaltic roof systems.

The preparation of these roof systems involves the following steps:

1. Removing loose gravel or overburden.
2. Making repairs to ensure the roof is watertight, similar to a temporary roof or vapor barrier.
3. Pouring the LWIC system of choice.

10. How much does LWIC weigh?

The weight of LWIC systems can vary depending on factors such as the required R-Value, substrate type, and the specific system used, be it an aggregate or cellular system. Refer to datasheets on siplast.com to find accurate weight values, both wet and dry, for specific LWIC systems.

NVS SYSTEM

The **NVS System** is an aggregate system used for non-venting substrates.

Commonly used in reroof scenarios with lower flashing heights

It can be utilized over various deck types, including:

- Vapor barriers
- Concrete decks
- Other deck types that do not allow for downward venting.

ZIC SYSTEM

The **ZIC System**, or Zonolite Insulating Concrete, is and aggregate system used in new construction projects:

When a slotted metal deck is the substrate

Note: The slotted metal deck allows for downward venting

Return to TOC

INSULCEL SYSTEM

The **Insulcel System** is a cellular LWIC system that can be used in the same project types as aggregate systems.

It can be utilized over various deck types, including:

- Vapor barriers
- Concrete decks
- Vented Metal Decks

Other deck types that do not allow for downward venting

Fleece-back single-ply can be directly applied to the LWIC surface. This is the only system that allows this type of direct membrane application

ZONOCEL SYSTEM

The Zonocel System is a hybrid cellular-aggregate system that uses cellular foam to offset some aggregate usage.

Suitable for applications similar to aggregate

Not recommended for direct application of single-ply membranes

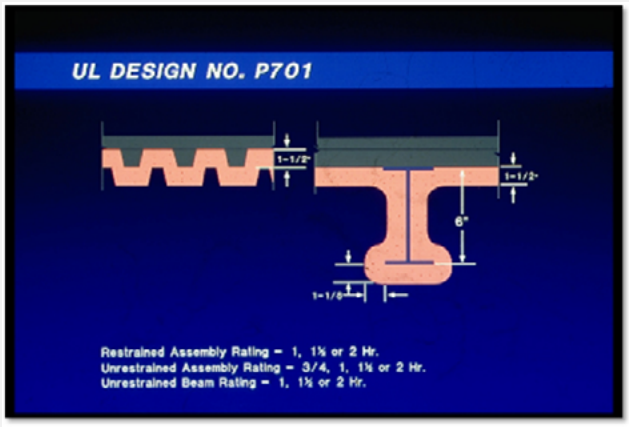
Offers aggregate-style performance at a lower cost

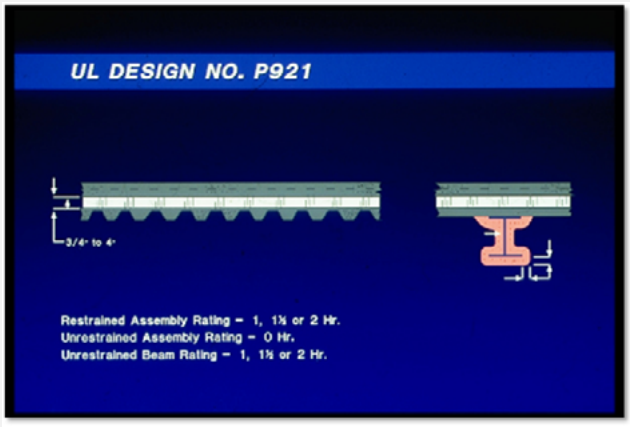
11. How Does LWIC provide UL Deck Fire Ratings?

LWIC has a significant advantage over rigid insulation systems when it comes to deck design and fire ratings. In a typical metal deck assembly with rigid insulation, the entire underside of the metal deck needs to be sprayed with fireproofing. However, with LWIC, only the structural members require fireproofing. This can help eliminate approximately 95% of the fireproofing required for a project.

By reducing the amount of fireproofing required, LWIC can be a cost-saving option compared to rigid insulation systems.

Contact Siplast Technical & Design Support for any inquiries or questions regarding UL Deck design with LWIC. Refer to the **UL Assembly Table Fire Resistance LWIC** for more information.





Eliminates cost and sequencing issues of spraying underside of roof deck.

Return to TOC

Ceiling Assemblies

12. Does LWIC contribute to Acoustic Design for buildings?

Using lightweight insulating concrete for acoustics in a roof can provide several benefits,including:

- Sound insulation: Lightweight insulating concrete is an excellent material for reducing airborne sound transmission. Its dense composition and high mass help absorb and dampen sound waves, helping to prevent them from passing through the roof structure. This can significantly reduce noise from external sources, such as traffic, aircraft, or nearby industrial activities, leading to a quieter indoor environment.
- Noise reduction within the building: Lightweight insulating concrete can also improve sound insulation within the building itself. It helps minimize sound transmission between different floors or rooms, reducing the transfer of unwanted noise and promoting acoustic privacy. This is particularly beneficial in environments where noise control is important, such as offices, hospitals, educational institutions, or residential buildings.

13. How does LWIC impact aging of roof membranes?

How does the temperature of a roof membrane affect its aging rate?

Raising the temperature of a roof membrane by 18 degrees Fahrenheit doubles its aging rate. Therefore, maintaining a cooler temperature for the roof membrane can significantly extend its lifespan.

How does LWIC contribute to keeping the roof membrane cooler?

LWIC helps maintain the roof membrane's cooler temperature by absorbing a portion of the energy. Siplast coined this absorption process as the "mass effect".

Why does LWIC slow down the aging of roof membranes?

The mass of the LWIC system plays a crucial role in slowing down the aging process of roof membranes. By having the LWIC topping placed above the Insulperm board, the LWIC can absorb some of the energy that would otherwise impact the roof membrane directly. This absorption reduces stress on the membrane over time and helps prolong its lifespan.

How does polyisocyanurate compare to LWIC in terms owf energy absorption?

Polyisocyanurate, due to its lower mass, lacks the capability to absorb energy effectively. As a result, it fails to alleviate the energy stress on the roof membrane. In contrast, LWIC, with its higher mass, can absorb a significant amount of energy and limit the impact on the roof membrane.

Return to TOC

Moisture

14. What effect does the moisture content in the LWIC mix have?

The presence of moisture in aggregate systems plays a crucial role in preventing shrinkage cracks and other potential issues. Cellular LWIC, characterized by a lower moisture content in the mixture, tends to dry faster, making it more susceptible to shrinkage cracks. These cracks are considered aesthetic concerns, they do not impact the overall performance of the system.

15. What happens if it rains on the lightweight before it is roofed?

Moderate Rain is a common occurrence that should not pose any major issues for a properly installed LWIC system.

- The drying process will need to be extended depending on the amount of rain that has affected the LWIC deck.
- Generally, an additional day of drying time is required.

In extreme cases, if a severe storm occurs and deposits a significant amount of rain in a short period, some water extraction may be necessary.

- Extraction involves cutting an opening near a drain or a low-lying area on the deck and using a vacuum to remove the water before starting the roofing process.

Return to TOC

16. Why does an aggregate system have more moisture when compared to a cellular system?

The inclusion of exfoliated vermiculite in aggregate systems leads to a sustained higher moisture level post-curing. Exfoliated vermiculite exhibits an impressive water-holding capacity, capable of absorbing up to 10 times its weight when combined with the Portland cement/water mixture. In contrast, cellular lightweight technology replaces traditional aggregates with foam, incorporating air bubbles into the mix. This results in cellular lightweight insulating concrete (LWIC) requiring approximately one-third of the water used in aggregate-based mixes during batch mixing.

Application

17. Which nailed base sheets are recommended for built-up roofs or modified bitumen?

Siplast typically recommends the following products for such roofs:

PARABASE	PARABASE PLUS
PARABASE FS	PARABASE PLUS P

Return to TOC

TECH TIP

Parabase FS offers enhanced adhesive control with a bond breaking film on the underside of the sheet.This film is a unique solution designed to maintain venting in cold adhesive applications. The film helps prevent adhesive migration through the base sheet and subsequent bonding to the LWIC surface. Parabase FS utilizes a low-profile base sheet with the film, offering a more efficient alternative than traditional methods that rely on heavier base sheets.

Parabase Plus P, a base sheet solution designed for use with self-adhering products, sets itself apart from standard nailed base sheets. Parabase Plus P features the Siplast formula for SBS modified bitumen asphalt compared to oxidized primed top surfaces. A proprietary Syntan® coating on the Parabase Plus P top surface allows for a more seamless adhesion to self-adhering products. In contrast, the sanded top surface of traditional base sheets can inhibit the bond of a self-adhered product.

TECH TIP

How long does it take for the lightweight to cure and be ready to roof?

The general guideline for LWIC curing is 48 to 72 hours, although this can vary depending on weather conditions and ambient temperatures. If temperatures consistently average below 50 degrees Fahrenheit, the curing time may be extended. For detailed information, please refer to **Siplast Bulletin #13**, which provides specific guidelines on when a LWIC system should be roofed.

TECH TIP

How long can LWIC stay exposed before installing the roof?

Siplast requires the LWIC system to be roofed over within 10 days. However, extended exposure of LWIC substrates is possible in certain cases. For cellular LWIC, roof installation should occur promptly if the LWIC is dry enough. Aggregate-based systems, with higher moisture content and exfoliated vermiculite, can tolerate longer exposure periods if needed For detailed information, please refer to **Siplast Bulletin #13**, which provides specific guidelines.

For additional assistance,contact the Siplast Technical & Design Support team to help determine recommended curing time for your project.

Return to TOC

18. Why are there cracks forming in the LWIC?

Cracks in the top pour of Cellular decks are common as the LWIC mix dries and shrinks. These cracks are typically superficial, but It is recommended to have a Siplast Field Technical team member assess and provide an inspection report.

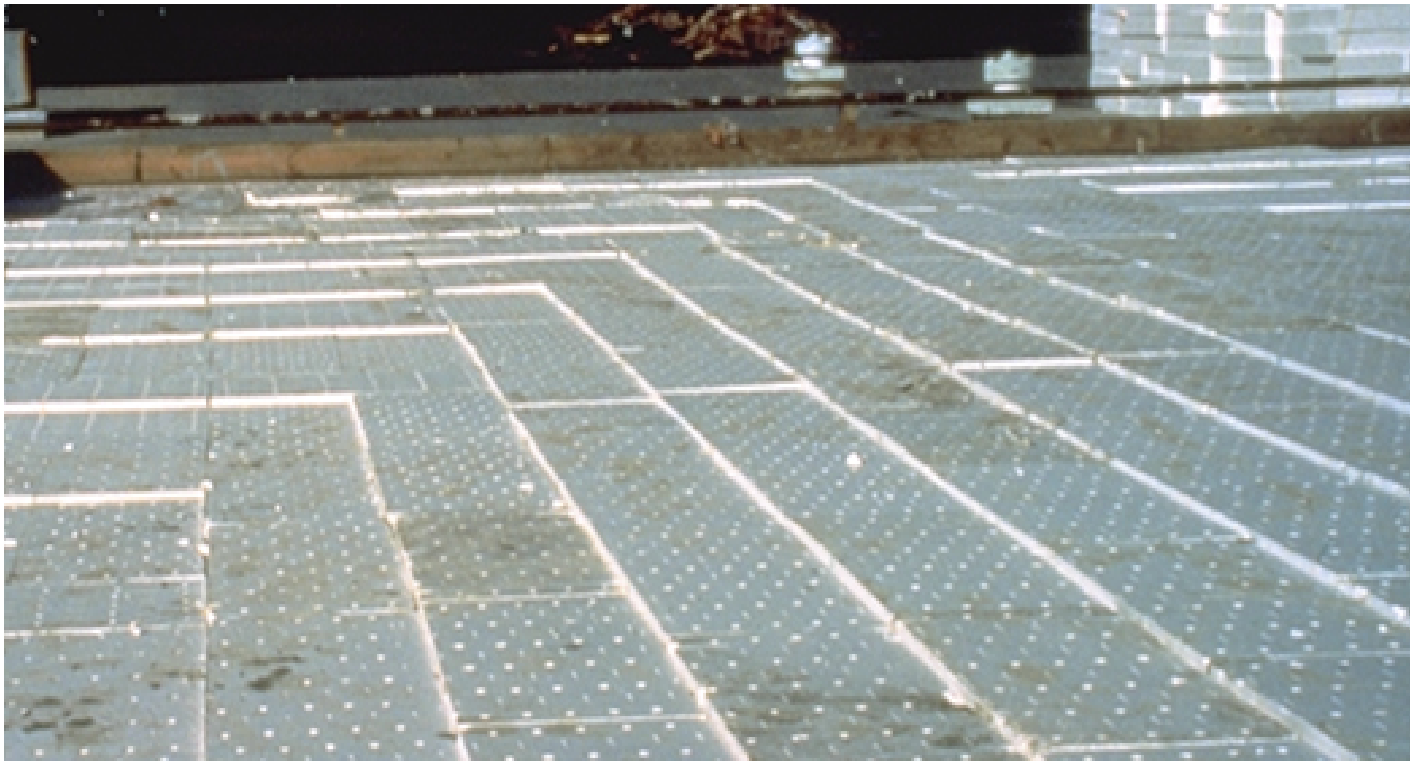
To arrange an inspection for your project, contact the **Siplast Technical & Design Support team**, or your local sales representative.

19. Are roof vents required?

Yes, roof vents are required for Siplast's LWIC systems. They can be achieved through One-Way Vents and venting flashing details at walls and curbs. Place One-Way Vents every 1000 square feet. Review the **Technical Bulletin** and **Roof Vent Model** for more information.

20. How is slope achieved with LWIC?

Slope is achieved by staggering the heights of the Insulperm (EPS) as shown in the image below.



Return to TOC

21. Can the Insulperm be left out overnight without having the top layer of lightweight concrete completed?

It is common practice to leave the exposed Insulperm set in the slurry overnight to allow the slurry to dry before applying the top coat. Review **Water Infiltration into Lightweight Insulating Concrete Applications** for more information on overnight exposure.

22. Can LWIC be installed over a painted metal deck?

For proper installation on metal decks, it is crucial to apply LWIC directly to galvanized metal decks only. The PH of galvanized steel stops the oxidation or rusting where paint could flake and rust. Refer to **Siplast Bulletin #1: SRIS-962 on Painting Welds**.

In cases where a painted metal deck has been utilized, the inclusion of a temporary roof assembly becomes necessary to create a barrier between the LWIC and the painted metal deck. Installing LWIC directly over painted metal decks can result in premature rusting of the underlying metal deck.

23. How do we keep LWIC from pouring into the building below at openings in the deck on New Construction Projects?

LWIC contractors should take the following precautions to prevent excess material flowing into the space.

- Pour stops are utilized by the contractors to surround drains, openings, and penetrations in the deck, including the perimeter, to minimize material overflow.
- In the case of a new construction roof area, during the initial day of pouring, there may be some minor dripping observed.
- Typically, by the second day, the dripping issue subsides, allowing work to proceed underneath the roof area.

TECH TIP

My project was supposed to use ZIC over a slotted metal deck but the contractor installed a non-slotted deck?

If this does occur, it would be advisable to transition the project to utilize Insulcel. Due to its lower moisture content compared to the aggregate-based ZIC, Insulcel can be installed over a non-slotted metal deck.

Return to TOC

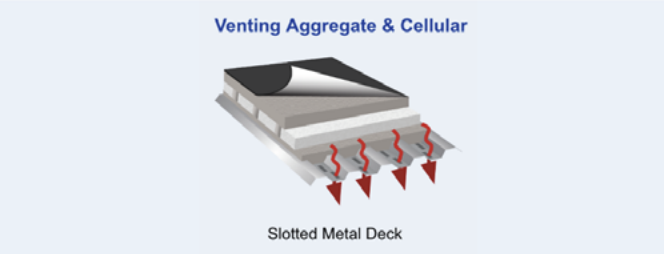
24. Where can you use aggregate LWIC?

Aggregate-based LWIC is generally used for built-up roof applications, such as:

- Two-ply modified bitumen or asphalt systems
- Gravel systems

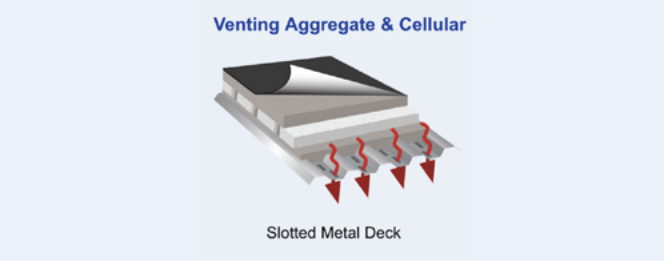
Aggregate decks can be installed over the following surfaces:

- Directly on to structural concrete
- Directly on to lightweight structural concrete
- Vapor barriers over existing decks
- Directly on to slotted and galvanized metal decks



25. Where can you use cellular LWIC?

- Cellular LWIC decks can be used as a substitute for aggregate in all applications.
- Suitable for fleece-back single ply applications where the single ply is directly adhered to the LWIC deck.
- Fleece-back single ply is not compatible with aggregate that contains vermiculite due to higher moisture content.



TECH TIP

Are there slope limitations to LWIC systems?

Aggregate LWIC can be used on steep slope surfaces like barrel roofs for acoustic benefits and fire ratings. However, if the slope exceeds 1.5 inches per foot, it can increase labor costs.

Cellular LWIC typically has a limitation of 3⁄4 inch per foot. To achieve a steeper slope with a cellular system, aggregate can be mixed with the material in that specific area, creating a Zonocel mix.

Return to TOC

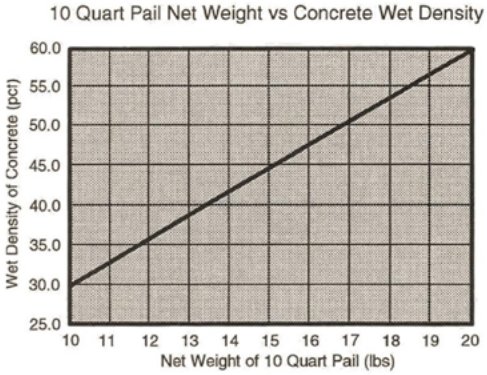
26. Is the LWIC being installed acceptable and in line with specifications?

To help ensure the LWIC installation meets the necessary requirements, you can utilize the tests below.

Method 1: Wet Density Measurement

- Our first and most widely utilized approach is the wet density measurement. This involves taking a 10-quart pail filled with LWIC mix from a batch being used on the project, weighing it, and multiplying the weight by 3. The resulting value should then be compared to the wet density design specified to determine if it falls within the acceptable range.

FIELD VERIFYING MIX DESIGN: BEFORE PLACEMENT



Method 2: Fastener Withdrawal Resistance Test

- Siplast employs an additional method known as the fastener withdrawal resistance test. After the LWIC has cured for at least 48 hours, this test is conducted. It involves fastening a base sheet fastener into the substrate, followed by a test procedure utilizing a commercial fastener withdrawal device. The minimum

FIELD VERIFYING MIX DESIGN: AFTER PLACEMENT

Digital

Analog

Fish Scale

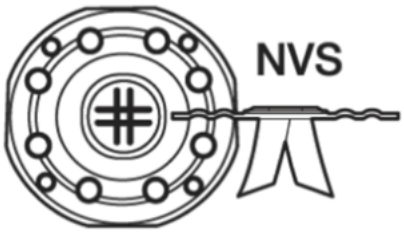
Return to TOC

Fastners

resistance required is set at 40 pounds, but in most cases, the fastener withdrawals exceed 60+ pounds.

27. Why is the NVS fastener shorter than the Zono-tite?

ZIC and Insulcel have a **2-inch** topping thickness over the Insulperm (a type of EPS Holey Board branded by Siplast). To secure this system, 1.7 inch Zono-tite Fasteners are used.



NVS is designed for re-roof applications and has a topping thickness of **1 inch** over the Insulperm, and a 1-inch NVS fastener is specifically required.

28. What should I consider when choosing the fastening pattern for my building?

The fastening pattern for a building depends on its specific wind uplift requirements. To ensure the appropriate pattern(s) are used, we recommend contacting Siplast Technical & Design Support for assistance in determining the most suitable fastening pattern for your project. Refer to the **Siplast Base Sheet Fastening Guide** for

Return to TOC

more details.

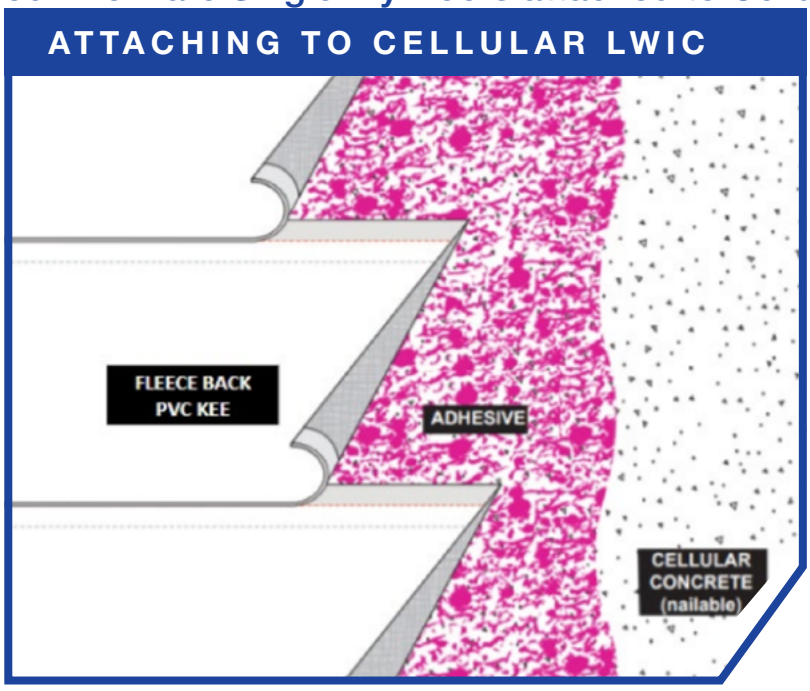
29. How is a roof attached to an aggregate system?

Aggregate mixes used with asphaltic roofs require a nailed base sheet. Different types of base sheets and fasteners are available. Contact Siplast Technical for guidance on suitable materials. Common fasteners are NVS (1" long) and Zono-tite (1.7" long). Fastener length varies based on LWIC system design.

Fastening patterns and data sheets can be found here:

- **Filtered Fastener in Document Library**
- **NVS Page**
- **ZIC Page**

30. How are Single Ply Roofs attached to Cellular LWIC?



In most cases, Single Ply roofs are adhered using a spatter pattern of low rise foam or bonding adhesives to the substrate. The Single Ply membrane used for this application is most commonly a fleece-back membrane, but smooth back is becoming more frequent in this application.

It is possible to use a nailed base sheet over the LWIC, but it is uncommon. This method is more likely to be used when the LWIC is an aggregate deck. After applying the nailed base sheet, the single ply fleece-back membrane is then adhered to the base sheet.

Read more about **Mass Effect** and the two-year study conducted on the roof systems.

Figure E

Substrate	Percentage increase in aging in relation to 1:6 ZIC
1:6 ZIC Aggregate (2 inches thick)	Baseline
1:4 ZIC Aggregate (2 inches thick)	7.2 %
DensDeck cover board (0.25 inches thick) with polyisocyanurate	49.1 %
Perlite cover board (0.75 inches thick) with polyisocyanurate	53.1 %