**SIPLAST LIGHTWEIGHT INSULATING CONCRETE BULLETIN:**

# R-value Calculations for Insulation Boards with Open Areas

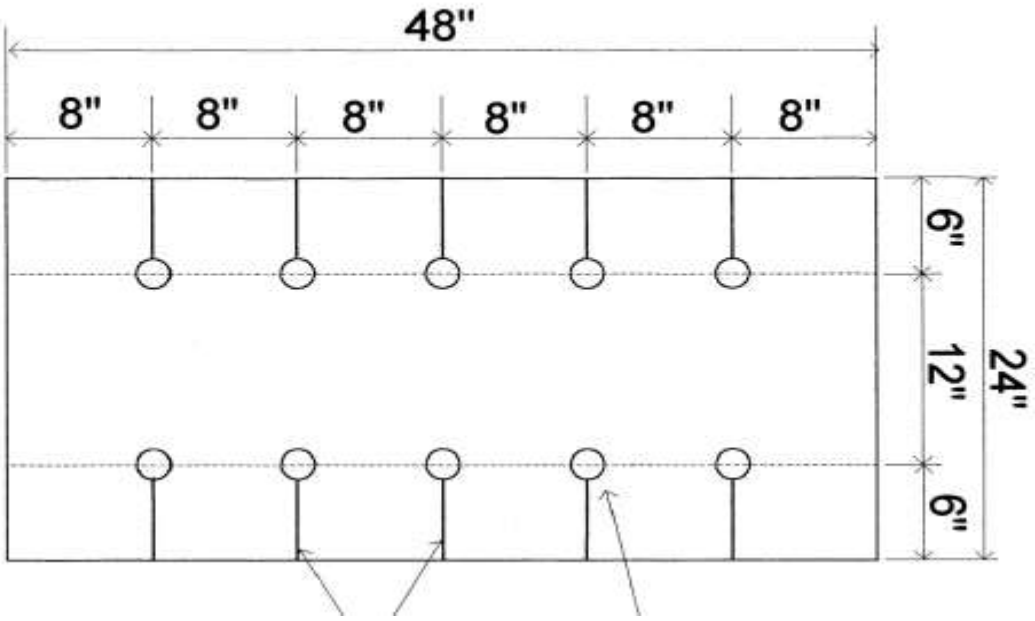
**Bulletin #19** **December 28, 2023**

SIPLAST*FLASH*

## Introduction:

This technical bulletin provides guidance on calculating the effective R-value of lightweight insulating concrete (LWIC) for roofs, taking into account the presence of a percentage of open area in the board. It is essential to accurately determine the thermal resistance of LWIC to ensure proper insulation performance and energy efficiency in roofing applications.

Siplast includes the effects of the 3% open area to the system R value calculation. It is important when using other LWIC manufacturers systems that this effect is considered if they do not supply the expanded polystyrene board. Siplast provides system r value tables which accounts for the full system r value measurement versus using a component calculation.

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14911 Quorum Drive, Suite 600
Dallas, Texas 75254-1491

201 Bewicke Avenue, Suite 208
North Vancouver, BC, Canada V7M 3M7

Customer Service in North America
1.800.922.8800 www.siplast.com

**Siplast Insulcel Weight and R value table from Insulcel Cellular LWIC Data Sheet**

## Insulation Value Table for Concrete and Reroofing Substrate Designs

*(2 inches of Insulcel Concrete and optional thicknesses of Insulperm over the substrate.)*

| Values Based on 2 Inches of Insulcel Concrete | | | | | |
|---|---|---|---|---|---|
| Thickness of Insulperm | Dry Weight of Insulperm & insulcel Concrete (PSF) | Wet Weight of Insulperm & insulcel Concrete (PSF) | U-Factor No Ceiling Heat Flow | | R-Factor |
| | | | Up | Down | |
| 0" | 5.0 | 8.0 | 0.270 | 0.244 | 3.2 |
| 1" | 5.5 | 8.7 | 0.129 | 0.123 | 7.4 |
| 1½" | 5.5 | 8.8 | 0.103 | 0.099 | 9.3 |
| 2" | 5.6 | 8.9 | 0.086 | 0.083 | 11.2 |
| 2½" | 5.7 | 9.0 | 0.074 | 0.072 | 13.2 |
| 3" | 5.8 | 9.1 | 0.065 | 0.063 | 15.1 |
| 3½" | 5.8 | 9.2 | 0.058 | 0.057 | 17.0 |
| 4" | 5.9 | 9.3 | 0.052 | 0.051 | 18.9 |
| 5" | 6.1 | 9.5 | 0.044 | 0.043 | 22.7 |
| 6" | 6.2 | 9.7 | 0.037 | 0.037 | 26.5 |
| 7" | 6.4 | 9.9 | 0.033 | 0.032 | 30.3 |
| 8" | 6.5 | 10.1 | 0.029 | 0.029 | 34.1 |
| 9" | 6.7 | 10.3 | 0.026 | 0.026 | 37.8 |
| 10" | 6.8 | 10.5 | 0.024 | 0.024 | 41.6 |
| 11" | 7.0 | 10.6 | 0.022 | 0.022 | 45.4 |
| 12" | 7.1 | 10.8 | 0.020 | 0.020 | 49.2 |

**Background:**

Lightweight insulating concrete is a popular choice for roofs due to its excellent thermal insulation properties, load-bearing capacity and reusability. To accurately determine the R-value of LWIC, it is necessary to consider any open area present in the board, as it can affect the overall thermal resistance.

**R-value Calculation for Open Areas in Insulation Boards:**

To calculate the R-value of LWIC with an open area, follow the steps below:

**Step 1:** Determine the R-value:

Obtain the R-value of the EPS board from the manufacturer which may, in many cases, be different from the manufacturer of the LWIC. Siplast does provide the EPS (Insulperm and cementitious mix materials for its LWIC systems. Siplast does not provide the Portland Cement which is sourced locally.

**Step 2:** Calculate the effective R-value:

To calculate the effective R-value of the LWIC board, use the following formula:
R value of solid EPS board/1+percent of open area = actual EPS R-value

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**Example:**

R value of EPS is 4 and percent open are of the board is 3.75%

4/ (1+.0375) =

4/ (1.0375) =

R-value less open space = 3.855

**Conclusion:**

Accurate R-value calculations are crucial for determining the thermal performance of insulation systems used for roofs. Considering the open area in the board ensures that the effective R-value accurately reflects the insulation characteristics of the material. Specifiers, architects, and contractors should use this bulletin as a guide when calculating the R-value of insulation systems to ensure they meet building code and specifications.

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