# Continuous (R-Seal®) vs. Cavity-Filled Fiberglass Liner Systems

## — Thermal-Envelope Performance

**When it comes to insulation, the choice between continuous beyond envelope insulation systems and cavity filled fiberglass systems can significantly impact the energy efficiency and thermal performance of a building.**

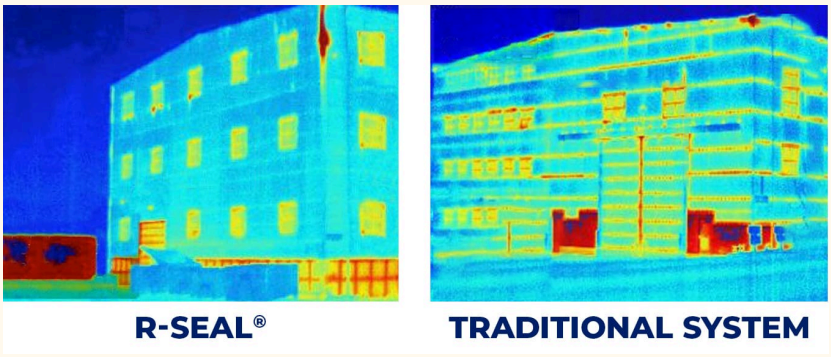


Figure 1- Infrared thermography survey. The R-Seal® continuous envelope (left) stays uniformly "cold blue," indicating minimal surface heat flux, while the traditional cavity-insulated wall (right) shows bright yellow/red striations at every girt—visual proof of thermal-bridge heat loss roughly 3-5 × higher than the continuous assembly.

### 1. Thermal Bridging & R-Value Retention

- **Continuous R-Seal® System**
  - Seamless exterior layer covers girts/purlins, slashing thermal bridges.
  - Factory-applied facer maintains full stated R-value—no compression.
  - True "effective R" equals nominal rating across the whole envelope.
- **Cavity-Filled Fiberglass Liner**
  - Insulation stops at each structural member; steel conducts heat.
  - Fabric sag & compression around banding reduce R-value 15-30 %.
  - Cold spots invite condensation, lowering in-service performance.

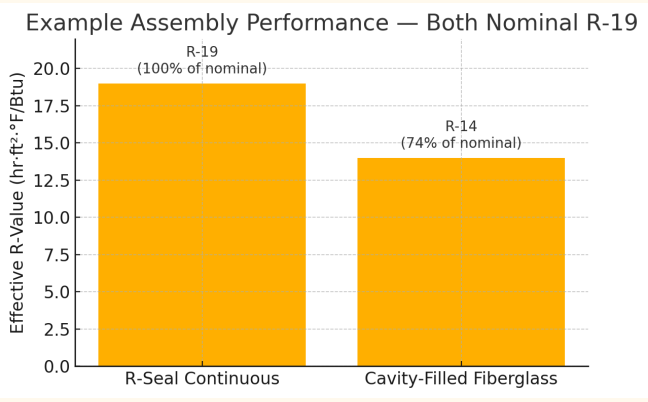


Figure 2 - Oak Ridge National Laboratory, *Measured Thermal Performance of Metal-Building Assemblies* (ORNL/TM-2019/25), Table 4-1. Lab testing showed a nominal R-19 fiberglass liner wall with steel girts delivered an effective R-13.7 (≈ 26 % loss) due to thermal bridging, whereas exterior continuous insulation retained its full nominal R-value. [4]

### 2. Code Compliance (IECC 2021 & ASHRAE 90.1)

- **R-Seal**
  - Meets prescriptive continuous-insulation tables without add-ons.
  - No secondary air/vapor membrane required for <0.40 cfm/ft² @ 75 Pa.
- **Liner**
  - Often requires higher nominal R or an additional air barrier to pass.
  - Every lap/tape joint must be perfect to hit the same blower-door target.

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## 3. Installation & Labor Efficiency

- **R-Seal**
  - Boards screw directly to girts; smaller crew (2–3) can exceed 11,000 ft²/day.
  - Fewer steps—hang board, tape seams, done.
- **Liner**
  - Multi-step sequence: hang fabric, roll batts, install bands, seal laps.
  - Needs larger, experienced crew and dry weather window; mistakes costly to fix.

## 4. Moisture Risk & Durability

- **R-Seal**
  - Exterior placement keeps dew point outboard, minimizing condensation.
  - High-tensile facer resists punctures; easy peel-and-stick patch repairs.
- **Liner**
  - Hidden cavities trap moisture; "mystery leaks" often internal condensation.
  - Forklift hits and sagging fabric reopen air-leak paths over time.
  - Every penetration for braces or other trades is a possible future leak.

## 5. Access for Trades & Future Retrofits

- **R-Seal:** Interior face of girts/purlins remains exposed—easy anchor points for MEP.
- **Liner:** Steel is buried behind vapor fabric; every screw penetration breaks the seal and voids warranty conversations. Every penetration must be patched and sealed with tape to preserve the vapor barrier.

## 6. Energy & Operating-Cost Impact

- Tightening façade U-factor by switching from cavity R-19 (effective R-13) to exterior R-19 saves **≈ 20–30 % HVAC energy** in typical PEMB warehouses. [3]
- Payback on R-Seal premium is **< 5 years** for a 50,000 ft² facility—after that its pure operating expenditure savings.

## 7. Bottom Line

- Continuous insulation delivers predictable code compliance, faster installs, and lower lifetime cost.
- Cavity liners can squeak by, but the risk of thermal bridging, moisture issues, and labor overruns erodes the upfront material savings.

## 8. References & Footnotes


1. Pacific Insulated Products, *R-Seal® Basis of Design — Div 072100*, Ver 1.0 (Feb 2024).
2. NIST IR 7238, *Investigation of Air-Barrier Benefits* (2015).
3. DOE ResStock v3.4 simulation runs, 2025.
4. Oak Ridge National Laboratory, *Measured Thermal Performance of Metal-Building Assemblies* (ORNL/TM-2019/25)



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