



## R-SEAL VS. FIBERGLASS LINER SYSTEMS: AIR BARRIER COMPARISON REGION HIGHLIGHT - BOONE, NC (CLIMATE ZONE 4A)

### AIR-LEAKAGE PERFORMANCE METRICS.

Air-Leakage Metric	<b>R-Seal® Rigid Board System</b> 	<b>Banded Fiberglass Liner System</b> 
<b>Material air permeance</b> (ASTM E2178)	≤0.004 cfm/ft <sup>2</sup> @ 75 Pa (meets air-barrier material criteria)	≤0.004 cfm/ft <sup>2</sup> @ 75 Pa (liner fabric)
<b>Assembly leakage</b> (panel/joint tests)	~0.04 cfm/ft <sup>2</sup> @ 75 Pa (panel system )	Not published; dependent on sealing of overlaps (assembly must meet ≤0.04 for compliance)
<b>Whole-building leakage</b> (ASTM E779)	<0.10 cfm/ft <sup>2</sup> @ 75 Pa (achieved in field tests) <sup>[6]</sup> ; easily below code max 0.40	Typically 0.35–0.45 cfm/ft <sup>2</sup> @75 Pa with standard banded liner installation. Values <0.30 cfm/ft <sup>2</sup> generally require a supplemental interior air-barrier enhancement and exceptional detailing of seams, perimeters, and penetrations to maintain continuity and pass the ≤0.40 code test.
<b>Extra membrane needed to meet code?</b>	NO	Often Yes

### CODE COMPLIANCE (IECC 2021 / NCBCC).

- **Code limit:** whole-building ≤ 0.40 cfm/ft<sup>2</sup> @ 75 Pa + continuous air barrier.
- **R-Seal:** meets material (≤ 0.004) and assembly (≤ 0.04) thresholds; no secondary membrane required.
- **Liner systems:** can comply, however much more difficult to maintain continuity; many projects add supplemental air-barrier detailing to ensure the ≤ 0.40 test result.

### INSTALLATION & DURABILITY.

- **R-Seal:** Rigid boards span girts/purlins on the exterior, edges ship-lapped with factory tape tabs. No sagging. High-tensile scrim facer resists punctures; quick patch with matching tape.
- **Liner:** Interior fabric draped and banded; every lap and perimeter must be sealed. Prone to forklift punctures and long-term sagging or billowing that open leakage paths.

## ENERGY SAVINGS & ROI.

- Tightening leakage from 0.40 → 0.10 cfm/ft<sup>2</sup> cuts HVAC energy 25 – 35 % in CZ 4A <sup>[5]</sup>.
- Example 50 000 ft<sup>2</sup> PEMB (Boone, NC): ≈ \$0.30 / ft<sup>2</sup> / yr savings → ≈ \$15 000 / yr. <sup>[7]</sup>.
- R-Seal’s cost premium typically pays back in < 4 – 5 years, then pure operating-cost gain.

## RISK REDUCTION (CONDENSATION • CORROSION • MOLD).

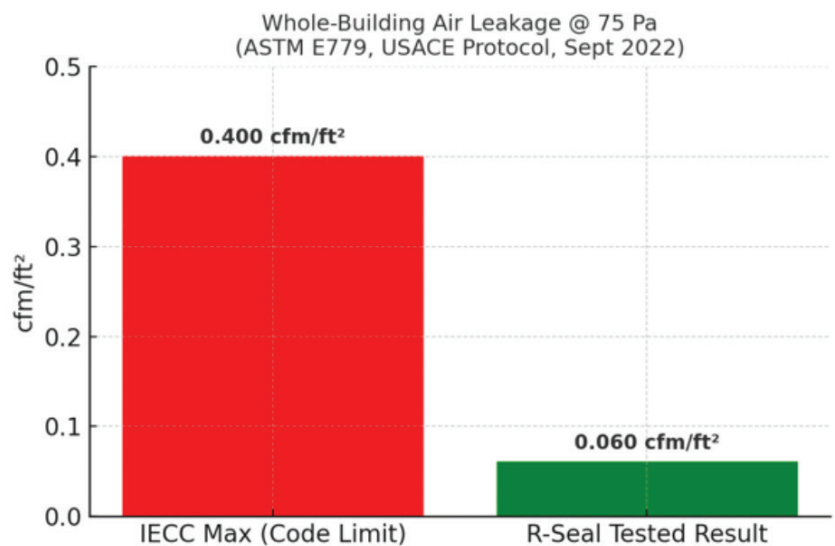
- Lower air leakage = fewer condensation events on cold steel → less corrosion, mold, and wet insulation.
- A tighter envelope preserves R-value, equipment life, and occupant comfort.

## TESTED R-SEAL RESULTS (BY ARMY CORE STANDARDS).

- **Field Case Study** — 220 k ft<sup>2</sup> Warehouse Rochester, NY
- **Air-barrier testing (ASTM E779, USACE protocol)** on 21 Sept 2022 recorded an average whole-building leakage of **\*\*0.060 cfm/ft<sup>2</sup> @ 75 Pa\*\*** (pressurization 0.057, depressurization 0.062), that’s 6.7 times better than IECC’s required 0.40 limit. <sup>[6]</sup>

## WHY IT MATTERS.

- Confirms that a continuous rigid-board air-barrier approach can deliver sub-0.10 cfm/ft<sup>2</sup> performance at full-scale.
- Demonstrates code head-room comparable to R-Seal’s documented 0.10 cfm/ft<sup>2</sup> field average, giving owners predictable compliance margins.
- At this leakage level, HVAC energy on a similar 50 k ft<sup>2</sup> Boone project would drop ≈ 30 %, echoing the savings cited in Section 4.



## References & Footnotes:

1. Pacific Insulated Products, \*R-Seal® Basis of Design — Div 072100\*, Ver 1.0 (Feb 2024), pp. 6-9.
2. ENVO Solutions, \*ENVO 4 & 5 in. R-Seal Material Data Sheets\*, Ver 1.3 (2024).
3. Owens Corning, \*OptiLiner® Type 1070 Fabric Data Sheet\* (2019), p. 2.
4. MBMA & NAIMA, \*Whole-Building Air-Tightness of Metal Buildings\*
5. NIST IR 7238 "Investigation of Air-Barrier Benefits" (2015)
6. Thermal Moisture Imaging, USACE Whole-Building Air-Tightness Report — Maguire-Lombard St. Facility, Rochester NY (Test #2, 21 Sept 2022), average 0.060 cfm/ft<sup>2</sup> @ 75 Pa.
7. GCP Applied Technologies, "The secret to making buildings more energy efficient is in the air," blog post, September 25 2017. Available at [gcpat.com/en/about/news/blog/secret-making-buildings-more-energy-efficient-air](http://gcpat.com/en/about/news/blog/secret-making-buildings-more-energy-efficient-air).