

Aerosol-Based Method Seals the Deal for Tighter New Homes

An aerosol sealant “fog” can simultaneously measure, locate, and seal hundreds of air leaks in new U.S. homes.

What if an aerosol-based sealing method could tighten new home envelopes more quickly and effectively than traditional sealing methods? The method involves pressurizing an entire building while dispersing an aerosol sealant “fog” to the building interior. As air escapes the building through leaks in the envelope, sealant particles are carried to the leaks where they make contact and stick, sealing the leaks. A standard blower door and connected laptop facilitate the sealing process and provide real-time feedback and a permanent record of the sealing. The technology is thus capable of simultaneously measuring, locating, and automatically sealing leaks in a building. In fact, hundreds of linear feet of narrow leaks can be sealed simultaneously,



Aerosol sealing installation on a single-family home including examples of seals formed. *Photos from UC Davis WCEC*

reducing the time needed for manual inspection and sealing.

To investigate the use of this method in new homes, the Center for Energy and Environment and partners worked with builders who performed the technique on 11 homes in California and 15 homes in Minnesota.

Key Findings

Aerosol envelope sealing was very effective at sealing air leaks in new homes. Many demonstrations resulted in a tightness below 1.0 ACH₅₀, which is well below the International Energy Conservation Code Requirement of 3.0 ACH₅₀ in climate zones 3–8.

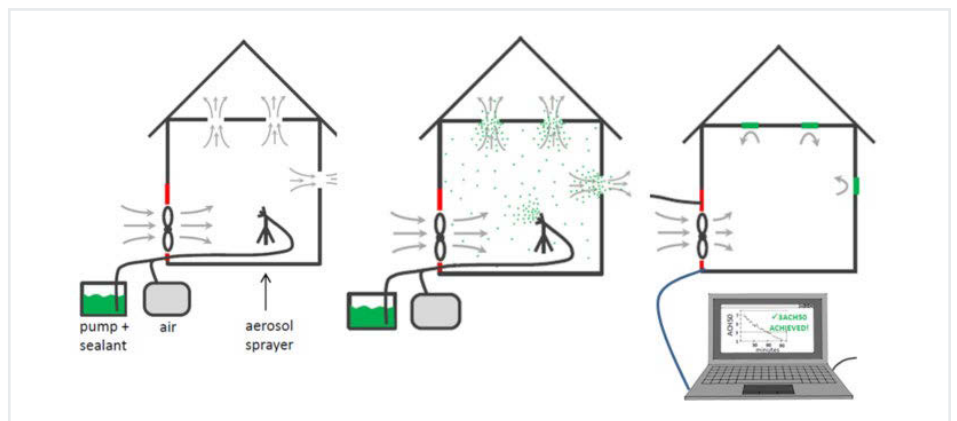
Project Information

Building Component: Envelope

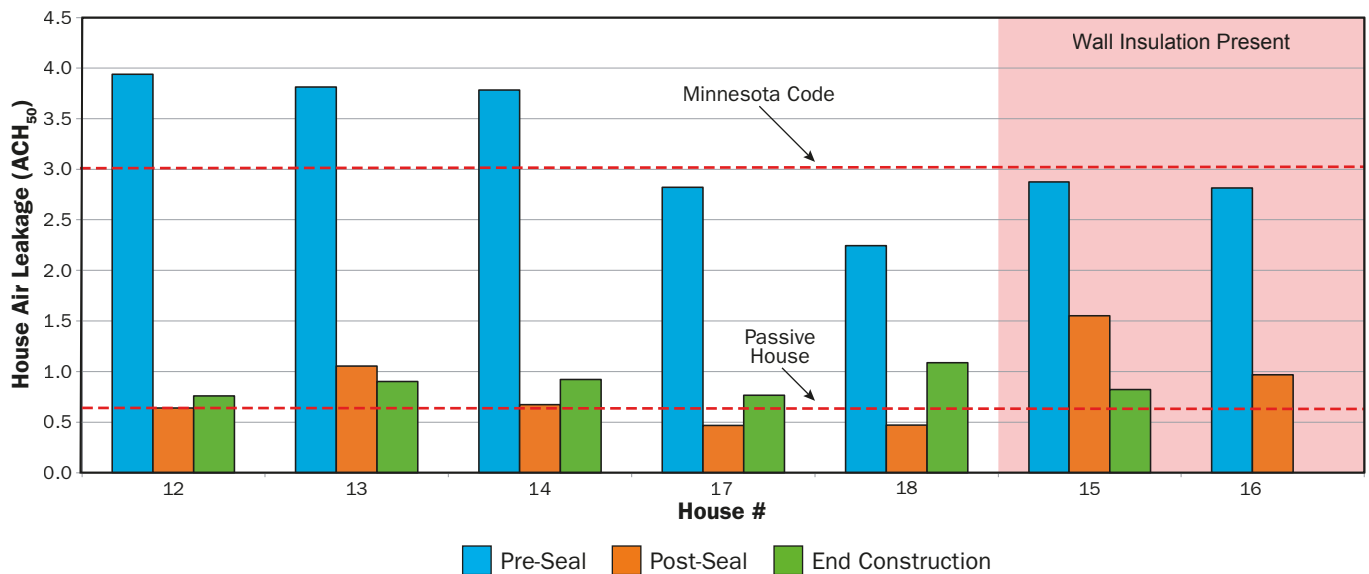
Team and Partners: Center for Energy and Environment, UC Davis Western Cooling Efficiency, Building Knowledge, Inc., University of Minnesota Cold Climate Housing Program

Application: Residential

Years Tested: 2016–2019



Progression of the sealing process. *Image from Center for Energy and Environment*



Summary of aerosol envelope sealing results. *Figure from Center for Energy and Environment*

The technology also demonstrated versatility in sealing homes at various stages of construction, including before and after drywall is installed. Even with changes to installation protocols, the process consistently reduced envelope leakage by 70% or more when evaluating the leakage before and after sealing. Larger energy savings were found in colder climates, due to the increased need for heating.

Market Impacts

The aerosol envelope sealing process produced tighter homes and demonstrated a potential opportunity for cost savings in the construction process. Compared with standard air sealing efforts, aerosol sealing can reduce or eliminate efforts in several areas by reducing other sealing work. For instance, builders can:

- Minimize material used for sealing a building, because aerosol sealing only applies material where leaks are present
- Reduce the possibility of redundant sealing (e.g., sealing on both external and internal wall surfaces) while ensuring a continuous air barrier is applied
- Reduce the number of trades involved in the air sealing process so that the responsibility for creating a successful

air barrier is clearly defined—fewer trades need to be trained and supervised, and less time is wasted sealing leaks that do not impact envelope leakage.

The research demonstrated that builders could use the aerosol sealing technology to meet their air leakage targets without requiring close attention to detailed air sealing work. The technology efficiently seals smaller, distributed leaks in a home, and these leaks are harder to address with conventional sealing techniques.

Builders still have concerns about cost and a hesitancy to reduce current sealing efforts, but the ability for the aerosol sealing process to meet even the most stringent leakage targets helps give builders confidence that their air leakage goals can be met without fundamental changes to their regular construction practices. As codes become more stringent, it is expected that builders will be more likely to adopt the aerosol sealing technology as a cost-effective tool for meeting future air leakage goals. ■

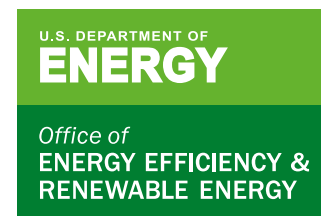
Learn More

Technical Report:

<https://www1.eere.energy.gov/buildings/pdfs/78112.pdf>



Photo from UC Davis WCEC



For more information, visit: energy.gov/eere/buildings/building-america

DOE/GO-102021-5568 · June 2021

Produced for the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, by the National Renewable Energy Laboratory (NREL).