

BY TED CUSHMAN

A Game Changer for Airtight Construction?

Nozzles inject AeroBarrier adhesive sealant into the air of a building under 100 pascals of pressure, along with humidity and heat. The caulking builds up and coagulates at air-leakage points, sealing small holes in minutes.



Photos courtesy AeroBarrier

It's rare for one innovation to transform a whole industry. But a new air-sealing technology called AeroBarrier may be poised to do exactly that for energy-efficient homebuilding in the United States.

In a time when production builders are struggling to make their houses airtight enough to meet the 3 or 5 ACH50 requirement in the latest energy codes, AeroBarrier, a simple system that blows a fog of caulk into the house while a blower door puts the building under pressure, has demonstrated the ability to bring a building from 15 air changes an hour down to less than one—in just a few hours and at a cost of around \$1,000 per house.

For the most advanced builders, this puts the 0.6 ACH50 Passive House standard within easy reach. For mass-market production builders, it makes meeting (or beating) code a no-brainer. And for the remodeling industry, it means that even if an existing house is fully drywalled and finished, airtightness to rival the performance of well-built new homes is within reach, without the cost of demolition or reconstruction.

Automated air-sealing. The concept of aerosol air-sealing isn't new. Weatherizing contractors in the U.S. are already familiar with a duct-sealing technology called AeroSeal, marketed by the same company that developed AeroBarrier. AeroSeal works by injecting a fog of adhesive caulking into the duct system as you pressurize the ductwork using a Duct Blaster fan. As air pressure pushes the aerosolized sealant out through cracks and gaps in the ductwork, the goo coagulates at the leak points and seals the holes. AeroBarrier, introduced to market at the International Builders' Show in Orlando, Fla., in January of this year, applies the same one-shot air-sealing concept to an entire building.

Mandalay Homes, a production builder based in Prescott, Ariz., volunteered a year ago to be AeroBarrier's guinea pig, testing the system out on dozens of houses. According to Geoff Ferrell, chief technology officer for Mandalay, his crew has been able to reliably bring houses down to 0.3 ACH50, time after time.

JLC met with Ferrell at the Builders' Show in January and spoke with him again on the phone last month. As of February, Ferrell told us, Mandalay's in-house AeroBarrier application crew has 77 jobs under its belt.



While a blower door pressurizes the house, emitter nozzles pump a fog of acrylic sealant into the building air. Walls can be exposed sheathing (above left) or finished with drywall (above right); either way, the aerosolized sealant flows out through any air leaks and coagulates on small openings as it encounters a reduction in temperature and humidity.

“We’ve been actively spraying AeroBarrier in all our homes since July 26 [2017],” said Ferrell, “and the system has worked every time.”

A fog of warm clog. “The beauty of AeroBarrier is how simple it is,” said Ferrell. “Basically, it consists of three things. There’s a blower door to pressurize the house; there’s a computer-controlled pumping system that pumps the product into the home; and then there is a series of nozzles—typically between six and eight, depending on the size of the house—that aerosolize the product in the home. All of that is driven from a support trailer that has a generator for power, and a compressor for compressed air.”

“When you pressurize the house to 100 pascals with the blower door, the house leaks,” Ferrell explained. “Everywhere it’s leaking, air is escaping. And once you aerosolize the AeroBarrier product into that shell, that product is leaking along with the air. The rig keeps the inside of the house warmer and more humid than it is outside, and when the fog hits that temperature and humidity differential, the product starts to gel, and it slowly builds up on itself.”

“So if you have a crack between two 2x4s, or in a corner, you’ll see the product build up on itself until it seals that leak, and it stops leaking—completely. At all those little spots you don’t even know are leaking, that product is collecting and sealing it off.” According to AeroBarrier, the process works on holes and gaps as wide as a half inch.

The sticky goo will clog any opening, Ferrell pointed out, so it’s important to mask off any element you don’t want sealed. “We’ve accidentally missed a bath fan or two,” he said, “and you get in there afterwards and that whole thing is sealed shut.”

Calibrated control. Applicators monitor the process using a laptop, said Ferrell. “You watch the blower door,” he explained. “So you start at 4 or 5 ACH50, or whatever it is. And as the house leaks less and less, that blower door scales back the airflow to maintain 100 pascals of pressure. You see it on a graphic display in real time—the leakage rate going from 4 or 5 ACH50 down to two, down to one, down to a half, down to 0.3 or whatever—wherever

we decide enough is enough [see chart, facing page]. And as you get lower and lower on that scale, your sealing slows down, because the air is leaking less. So it takes more time to seal up those last few tiny cracks.”

Mandalay was building tight homes before the company began to spray AeroBarrier, said Ferrell. “We use open-cell spray foam for walls as well as for our sealed cathedralized attics,” he explained. “Our company average for the previous two years, prior to AeroBarrier, was about 1.45 ACH50. And we were happy with that; but the problem was consistency. We would accidentally hit 0.8 ACH50 on some homes, but then we would accidentally have 2.0-plus ACH50 on some homes. AeroBarrier has helped us go from 1.5 ACH50 down to finish numbers of 0.5 or 0.6 ACH50 on our final test. That’s almost 300% tighter. But it has also given us consistency. And we know as soon we are done applying AeroBarrier how tight that home is, because the computer has been graphing it the whole time.”

Testing in, testing out. From experience, Ferrell said, his team knows what to expect as a pre-AeroBarrier blower-door test value. They use that knowledge as a pre-treatment screen for problems, he explained: “When we first turn the blower door on and get our initial leakage level, if it’s an unexpectedly high number, we go in the house before we start spraying the product and look for obvious holes. So if somebody poked a hole for a wire, or we missed something on an outside wall around an outlet, you can

hear the air whistling through it when you’re at 100 pascals. So we plug those big leaks with some canned foam before we start the AeroBarrier process.”

AeroBarrier seals everything, noted Ferrell—even the gaps around operating window lights. “No window is perfect,” he said. “Especially a single-hung or double-hung window—they will leak a little bit of air where those sashes meet. And during the AeroBarrier process, those cracks get sealed. So when we are done sealing the house, we shut down the system, then we go through and make sure to operate every single window and door, to break those seals. And then we close all the windows and doors back up, turn the blower door back on, and retest the house. We want to know how much our houses leak with operable windows in them.”

Interestingly, this step lets Ferrell know exactly how leaky his windows are. “So far,” he said, “27.42 cfm per house is our average leakage attributable to windows.”

Six or eight weeks after the AeroBarrier job, when Mandalay’s HERS raters come in to audit the completed house, Ferrell can compare the final value with the record from the home’s AeroBarrier printout. “If that number’s much different,” he said, “we know a change has happened, and it’s easy to troubleshoot. Usually if I call the super and tell him we’re seeing an unexpectedly high number, he’ll remember—‘Oh yeah, they stuccoed over an exterior outlet and we had to dig it out,’ or whatever. So then we can go back and do a surgical strike on that leak.”

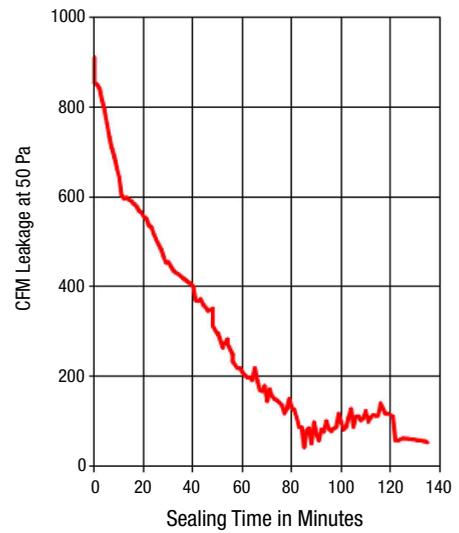
Townhouses and retrofits. *JLC* spoke by phone in February with AeroBarrier’s manager of business development, Paul Springer, who was demonstrating AeroBarrier on site at a multifamily project for a production builder in Maryland. In this townhouse, Springer explained, drywall was already up—because that was the most practical way to button up the party walls between units. “Sealing those party walls is the hardest part for multifamily builders,” said Springer.

Not every builder wants a squeaky-tight home; at this townhouse job, the airtightness goal was 3.0 ACH50. That way, Springer explained, the unit wouldn’t be required to have mechanical ventilation. “Whatever it is that you need to hit, we know what it is in real time, so we just turn the system off,” Springer said. “We guarantee it. And we give the builder a certificate of completion.”

In retrofit situations, Springer said, the job can be sprayed at any point: The building could be completely gutted, completely insulated and finished, or anything in between. “As long as you can pressurize the space, we can seal it.”

Following the January launch, Springer said, AeroBarrier is focusing on growing its market. “We are actively building out our network,” he said. “People that want to do the work, we’re talking to them. Builders that want to engage with it, we are talking to them. We are not turning anybody away.”

Ted Cushman is a senior editor at JLC.



AeroBarrier’s operating software lets technicians follow progress in real time as the home gets tighter, and also lets them stop the job as soon as the home reaches the builder’s airtightness target. A printout (example above) documents the results.