

AIR-SEALING



Air-Sealing the Garage Wall

Energy is not the only reason to get this right

BY MATT RISINGER

Most attached garages are unconditioned and effectively “outside,” so the wall between an attached garage and living space is part of a home’s thermal enclosure. The energy performance of the homes I build is important to me, but it turns out there are other important reasons for focusing my air-sealing efforts on the garage wall. For one, it’s an important fire barrier. According to the U.S. Fire Administration, around 7,000 residential fires start each year in the attached garages of one- and two-family homes, and the majority of these fires spread further and caused more damage than other residential fires, largely because of all the fuels—flammable liquids, paints, chemicals, ammunition, recyclables, and other

items—stored in garages. This array of fuels also hints at the toxic cocktail of fumes from vehicles, lawn equipment, and all those chemicals that may be getting sucked into the house and creating terrible indoor air quality.

The most common and noxious of these gases is carbon monoxide (CO), which in the best of cases is released for only a moment when a car drives in or starts up. In the worst cases, however, the release of CO into the garage can be a sustained event that turns fatal. A report last year in *The New York Times*, “Deadly Convenience: Keyless Cars and Their Carbon Monoxide Toll,” examined cases of car owners leaving their cars running because the drivers didn’t know the cars were still running after they were parked. The CO buildup

Photos: Risinger & Co.



In a typical one-story garage attached to a two-story home, the roof ties into the second-floor walls; in this case, into the knee walls of a much larger attic area. Below the rim joist, the author's crew hangs drywall on the garage side of the wall, ahead of the drywall crew that will install drywall in the rest of the house (1). This allows him to begin air-sealing penetrations, such as packing electrical boxes with a two-part, closed-cell spray foam (2).

in garages leaked into the homes, tragically resulting in the deaths of occupants. For builders, all these issues—energy performance, fire safety, and indoor air quality—serve as so many wake-up calls, signaling what's at stake if we don't air-seal the garage wall.

COMPLETE SEPARATION

In the photos in this article, we show a typical one-story garage attached to a two-story house. To create a tight, thermal barrier, my crew starts by hanging drywall on this wall after framing. This happens before the drywall subs come and hang all the drywall in the rest of the house. Most of the time, our exterior wall framing is 2x6. (Yes, the garage wall is an exterior wall; it's the thermal boundary between inside and outside the home.)

Installing this drywall ahead of time allows us to take care of two critical details: penetrations and the roof bypass.

Penetrations. We install a two-part, closed-cell spray foam around any electrical boxes or other wall penetrations to create a tight air seal. In most residential garages, it is not practical to avoid outlets or lights on the garage wall; they serve a practical purpose for homeowners, and eliminating them is really not an option. But because we need to have these penetrations, we need to be certain they don't leak.

Roof bypass. This detail is perhaps more important because it represents such a big air bypass. We seal the garage wall all the way up to the roofline. This means we extend the drywall to the

rim joist, and, above the ceiling line in the garage, we sheathe to the roofline with 1/2-inch plywood or another sheet good. (This is one good place for Thermoply, which I would not ordinarily use as an exterior sheathing, but in this case is used solely as a backer for the insulation; the smooth surface adheres well to tape at the seams for a good air seal.) Without this added sheathing, the wall above the ceiling is completely connected to the second story of the home. It's best to do this at the framing stage, before the mechanicals are installed. But we've also followed on the mechanical installations by sealing any wiring and other penetrations that run inside the garage wall.

On the house shown in these photos, we insulated the walls with Rockwool and with open-cell foam. While we need closed-cell foam to air-seal large and direct penetrations, we get a pretty good seal with open-cell foam in the wall cavities, as long as we apply it at least 4 inches thick. On the wall above the rim joist to the garage roofline, the insulation contractor will spray the sheathing with 6 inches of closed-cell foam so we get a good air seal and thermal barrier.

SILL SEAL

With a new home, we like to have the garage slab poured integrally with the rest of a structural slab for the house. But in existing homes we are renovating, it's not uncommon to have the garage slab butting the main house foundation, whether that foundation is a structural slab, a stem-wall foundation, or a full basement.



The garage-wall cavities are insulated with an open-cell spray foam. If installed to a depth of at least 4 inches, an open-cell foam provides a decent air seal to close off small cracks and gaps in the stud bays. Notice that the author frames with a California corner, so wall corners can be filled with insulation **(3)**. The rim-joint area and the wall above the rim joist are insulated to the roofline of the attached garage with 6 inches of closed-cell foam **(4)**. This not only insulates the wall but also seals all penetrations.

And whether there is a step up to the house from the garage slab or not, in all cases, we have a critical air seal to make between the concrete and the bottom sill of the garage wall.

For sealing the slab-to-wall transition, the easiest method is to simply lay a fat bead of caulk in the gap created by the foam sill seal between the foundation and the framing. A top choice is a single-component, nonhardening synthetic rubber, such as Tremco's Acoustical Curtainwall Sealant (what has been commonly dubbed "black death" in the field). This material stays flexible for an incredibly long time. But an exterior silicone formulation for concrete or a high-quality polyurethane sealant can also work for this application. In any case, I prefer sealants that come in sausage packs and that can be applied with a professional-grade gun. A sausage gun is so much easier to control and much less tiring to use than a skeleton gun.

If there's a step up from the garage and the concrete-to-wood connection is on the vertical plane of the wall, I prefer to use a fluid-applied sealant, such as Prosoco's R-Guard Joint & Seam Filler.

Or I use Blue Barrier, which is a bit thicker than R-Guard and fills gaps up to $\frac{3}{4}$ inch. I do this before installing the drywall, and then we run the drywall past the sill plate to cover the joint and create a gasket effect. (We use the same material on the exterior walls for sealing the concrete-to-wood connection at the sill, usually after the walls have been sheathed. In this case, we will often run a temporary line of tape on the concrete so we get a clean line with the sealant that we can cover with the siding.)

The Prosoco product line evolved from material developed in Japan for installing windshields; the material is both adhesive and waterproof, and it sticks on just about any surface. These materials are moisture-curing compounds, so they bond directly to damp or dry surfaces, even green concrete, with no primer needed, and cure under a variety of weather conditions. Low temperatures and dry conditions will slow down the drying time, while high temperatures and high humidity or wet conditions will accelerate curing. But the bond will only improve over time, which strongly appeals to me. I also like that this material bonds without primer. In most



Thermoply is not a sheathing the author ordinarily uses for structural framing, but it proves to be an excellent backer for air-sealing above the rim joist to the roofline (5, 6). The reverse side of this sheathing was later insulated with 6 inches of closed-cell foam. Seal along the base of the wall between the concrete and the bottom plate with more than the standard foam sill seal. A siliconized acrylic caulk formulated for concrete (7) or a good-quality polyurethane sealant (8) works as a sealant here.

other cases, there are almost always issues with sealing to concrete. Form oils, wax, concrete additives, and especially moisture all can affect the bond, and I always feel reserved about the long-term viability of an adhesive bond. These fluid-applied options form a “rubber barrier” at the base of the wall and do an excellent job at stopping airflow.

BONUS COVERAGE

The issues surrounding air-sealing are much more involved if the house has a “bonus room” over the garage. In my market, we don’t do those much, but they are popular in the production market, and they are often done very poorly. For information on this,

see the article “Fixing the Bonus Room” by Matt Bowers (Mar/17), a home-performance contractor in upstate New York who has made a steady business of solving the comfort problems associated with living space over the garage. It’s worth keeping in mind that while the air leakage into these above-garage rooms during a cold, New York winter can render these rooms nearly uninhabitable, the problems don’t stop there. They are also potential indoor air-quality nightmares.

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