

PRE-INSULATION AIR-SEALING FOR CONTRACTORS



LOCTITE®

According to data from the U.S. Department of Energy, homes and commercial buildings consume about 40% of energy used in the United States. Of that energy, 45% goes into heating indoor spaces and another 9% into cooling indoor spaces. On average, Americans spend \$2,000 on energy annually—and between \$200 and \$400 of that goes to waste due to air leaks, drafts, and outdated HVAC equipment.

In other words, roughly 20% of the energy that modern homes and commercial buildings use goes to waste, and in newer construction, featuring up-to-date HVAC equipment, air leaks are by far the biggest remaining culprit.

So, what's the solution? Addressing vulnerabilities in the building envelope during the construction process is the best place to start. On most builds, contractors install insulation once the sheathing, HVAC, electrical, and plumbing are completed, but adding an extra air-sealing step just prior to insulation installation creates a tighter building envelope that ultimately consumes a lot less energy.

Pre-insulation air-sealing is a cost-effective process that has many advantages. It helps insulation perform better, and the reduction in drafts and leaks creates a more comfortable environment. The EPA estimates that in an existing home, one can achieve a 25% reduction in air infiltration with proper air-sealing. Air-sealing during the construction process before insulation reduces air leaks because builders can do a much more thorough job while wall cavities are still open.

So how do you approach pre-insulation air-sealing on new builds? It starts with choosing the right products—and for that, Frank Ziegler, senior brand manager for Loctite, will join in to discuss the Loctite TITE FOAM line of products. We will also discuss the areas most commonly in need of sealing, as well as best practices for each location.

“Roughly 20% of the energy that modern homes use goes to waste. Air leaks are by far the biggest culprit. One can achieve a 25% reduction in air infiltration with proper air-sealing.”

Spray Foam for Air-Sealing

Air-sealing starts with the right products—like weatherstripping around doors, or gaskets for outlets and light switches, for example. Spray foam also plays a huge part in air-sealing around plumbing, electrical penetrations, and other areas that may not have fully closed gaps.

Loctite offers a range of polyurethane-based insulating foam sealant products that work well for air-sealing, including:

TITE FOAM Gaps & Cracks for gaps up to 1 inch

TITE FOAM Window & Door for sealing around window and door rough openings

TITE FOAM Big Gaps for gaps up to 3 inches



What's the difference between these three products? Slight differences in formulations and applicators make each a good solution for specific purposes, which is why it's important to choose a product that matches the desired application.

“Our Gaps & Cracks and Big Gaps have unique straw diameters,” Frank says, “so the product will fill either a 1-in. gap or a 3-in. gap. The Window & Door product is specially formulated to expand at a lower pressure to prevent bowing window and door frames as the foam expands. These unique features allow for the proper application.”

“Loctite foams have what we call ‘premium durability,’” Frank says. “With premium durability, you get high density, you get flexibility, you get adhesion and UV resistance. You want durable foam because these products are usually behind a finished area of a build. You want to make sure you use the right product the first time so you don’t have issues down the road.”

While air-sealing typically takes place indoors or inside wall cavities, TITE FOAM products are also suitable for outdoor use. They will adhere not only to wood framing, but also to most other building materials including concrete, metal, and PVC. To help prolong UV resistance, you can cover the foam with an exterior paint or coating. TITE FOAM’s bright white color will also take color better than yellow or brown foams for a professional finish.

Common Areas to Air-Seal

When air-sealing a new build, there are several areas that need special attention. In many of these spots, products like caulk or spray foam are ideal for sealing gaps, although there are some instances with water-resistant barriers where specialized measures may be required.

Below we take an in-depth look at common areas that should be air-sealed prior to insulating and how to properly seal them.

FLOOR PLATES AND WALL PLATES

Key considerations for both floor plates and wall plates include gaps between the plates and any electrical or plumbing penetrations that run through the plates. Most floor and wall plates consist of layered 2x4 studs, and because the layers generally fit tightly against each other and against the floor or foundation, one might conclude that no air-sealing is necessary.

However, even though these gaps are small, they should still be sealed. Use caulk where the floor plate meets the floor, and between each layer of the plate to stop air leaks. In cases where gaps are large enough to make caulk an impractical option, use Loctite's TITE FOAM Gaps & Cracks.

TITE FOAM Gaps & Cracks is also recommended for sealing around electrical and plumbing penetrations that run vertically through the floor and top plates. At the floor level, use the foam on top of the plate to seal around conduit or pipes. For wall plates, seal along the underside of the plate for best results.

ELECTRICAL AND PLUMBING PENETRATIONS

As discussed, TITE FOAM Gaps & Cracks is useful for sealing horizontal and vertical electrical and plumbing penetrations within wall cavities. With its durability, builders can also use it to seal around penetrations that run between the indoors and outside.



SEAL THE GAPS between walls and floor plates. TITE FOAM Gaps & Cracks works well for this job.

Use Gaps & Cracks to seal around any indoor to outdoor penetrations 1 in. or smaller, or use TITE FOAM Big Gaps for openings up to 3 in.

STUD CAVITIES

Stud cavities have several areas that should be sealed, so using TITE FOAM Gaps & Cracks is a good choice for this job. Run a bead of foam around each of the following areas:

- Where vertical studs meet the sheathing
- Where floor plates and wall plates meet the sheathing
- Around any horizontal electrical or plumbing penetrations
- Where wiring enters insulated junction boxes

Caulk is useful to seal seams in the sheathing on the inside of the structure. Just prior to hanging drywall, be sure to use foam gaskets around outlets and light switches to prevent air leaks.

WINDOWS AND DOORS

All too often, builders resort to fiber insulation to seal around the rough openings for windows and doors, and this method all but guarantees eventual air leaks. Two methods are preferable to properly seal these openings: closed-cell foam blacker rods, or Loctite's TITE FOAM Window & Door formula.

FIREBLOCKING

Fireblocking refers to the process of cutting off pathways that smoke and flame could take through a structure's framing, and there are many methods of properly fireblocking a home or commercial structure. Wall plates are an example of fireblocking because they help slow the movement of flame from one floor to another.

So how does fireblocking intersect with air-sealing? Often, air-sealing techniques are similar or even the same as common fireblocking techniques, though the products involved may differ.

Wall plates are a method of fireblocking because they slow the spread of flames to the floor above, but those flames will still spread through small gaps and cracks—the process just takes a lot longer than flames racing up the interior of an open wall cavity, long enough for smoke to trigger alarms and sprinkler systems, giving time for occupants to evacuate.

Where wall plates are concerned, one way to slow the spread of flames even more is to use caulk or spray foam to seal the gaps. The key here is to make sure to use approved materials like specialized fireblocking spray foam and fireblocking caulk.



FIREBLOCKING HELP. To slow the spread of flames even more than with wall plates alone, use specialized fireblocking spray foam to seal gaps.

The first method requires the use of closed-cell foam backer rods (as opposed to open-cell foams, which can absorb moisture). These can fill gaps up to 1½ in., though builders can purchase large backer rods up to 4 in. in diameter for specialty applications. To use these rods, choose a diameter slightly larger than the gap, and press the rod into the gap.

An even better solution is to use Loctite's TITE FOAM Window & Door formula. Simply spray it into gaps around window and door frames to easily create an airtight seal.

Using Loctite's TITE FOAM Window & Door has several advantages over using backer rods. For starters, the spray foam adheres directly to the framing, which provides a better seal compared to foam that is pressed into place. Loctite's premium durability also means that the foam will stand up to possible moisture, and is flexible enough that it maintains a strong seal even when the structure shifts and settles over time. Keep in mind, too, that the Window & Door formula is specially designed to expand at a lower pressure to prevent bowing window and door frames.



ATTACHED GARAGES

Air-sealing attached garages comes with two major concerns. First, as with any interior space, builders should seal exterior walls as thoroughly as possible to prevent air leakage and energy wasted on excessive heating or cooling. This process is similar to sealing floor and top plates, wall cavities, around wall penetrations, and around the rough openings for windows and doors.

The second major concern is the barrier between the garage and the rest of the home. It's critical to create an airtight barrier here to prevent carbon monoxide or other dangerous contaminants from infiltrating living spaces.

You can create a barrier in several ways, but here is a recommendation:

- Seal all wall cavities, windows, doors, floor and top plates, and penetrations with caulk or spray foam.
- Use rigid foam board cut to fit all wall cavities and joist bay openings along shared walls, floors, and ceilings between the garage and the living space.

CHOOSE A SPRAY FOAM
for windows and doors that
expands at a lower pressure
and will not bow the frame.

- Use spray foam to seal around the edges of the foam board, and around any penetrations through the foam board.

It can be a labor-intensive process but following these steps will keep living spaces leak-free and safe from hazardous contaminants.

WATER-RESISTIVE BARRIERS

Water-resistive barriers (WRBs), whether the products are sold as barriers or housewraps, typically come as a system. This means adhesives, sealing tapes, and other supplies are generally designed for use with specific WRB systems. For builders, this often means procuring sealants and other supplies from the same manufacturer as the WRB.

Because WRB systems are meant to provide a high-performance airtight and watertight barrier, additional sealing may prove redundant—but can still be a good idea just in case the WRB ever develops leaks or fails. As with other types of building systems, the best course is to always check installation instructions and warranty information to learn which products should or should not be used.

While many WRBs come as complete systems, builders can also use rigid foam board to create a WRB. With this type of barrier, high-density spray foam like Loctite's TITE FOAM Gaps & Cracks is invaluable for sealing the foam board's edges plus any penetrations or gaps in framework. TITE FOAM is a good choice because the foam features a uniform cell structure that seals out air and moisture. When combined with moisture-resistant foam board, it can create a solid building envelope with high moisture and air-infiltration resistance.

BLOWER-DOOR TESTING

Once air-sealing is complete, it's smart to perform a blower-door test. So how does that work?

It starts with a powerful fan that a professional attaches to a window or door frame in the structure. The goal is to create a pressure differential between indoor air pressure and outdoor air pressure, so the fan will blow air out of the structure to reduce indoor air pressure (or into the structure to increase it).

As air pressure equalizes between the interior and exterior of the structure, air will flow through the leaky areas. The professional conducting the test can walk around the interior with an infrared camera to spot the leaks.



TEST THE SEAL. A professional blower-door test will identify any leaks you may have missed.

Best Practices for Single-Use Spray Foam Cans

Here are several best practices to follow when using spray foam products:

- Apply spray foam when temperatures within the working area are between 23°F and 95°F, and make sure the temperature of the product is between 41°F and 86°F.
- When working in the cold, be sure to store cans at room temperature for at least 12 hours prior to use.
- Shake each can vigorously before use, then attach the straw trigger and hold the can upside down to apply foam.
- Where possible, prevent UV exposure during the curing process to prevent discoloration.
- Loctite TITE FOAM should cure in approximately 24 hours, though lightly misting it with water can help speed the curing process.

As far as preparation goes, Frank recommends always starting with the instructions to make sure you are familiar with the specifics and to take safety precautions. “We always recommend wearing gloves, and that the area that you are going to dispense in is properly prepped,” Frank says. “Preparation doesn’t need to be anything complex. Just make sure the area is clean and free of dust and debris.”

For first-time users, he recommends starting small. “Get used to how fast and how much pressure you need to squeeze the trigger,” Frank says. “You will have a better application experience the more you practice.”

For cleanup tips, Frank recommends using acetone. “They sell spray acetone at a lot of different hardware stores that quickly dissolves poly foam,” he says. “The other thing, too, is if you by accident fill out too much, after the product is cured you can cut this back flush.” This is especially helpful around window and door rough openings where expanded foam can be trimmed away so that it doesn’t interfere with drywall or millwork.



THE RIGHT POSITION To apply spray foam properly, shake the can, attach the straw trigger, and hold the can upside down.

In Summary

Insulating foam sealant products like those in Loctite's TITE FOAM line are often recommended to homeowners or DIYers for retrofitting and air-sealing long after the home has been built—and it's true that this is a fantastic way to seal air leaks in older homes. However, these products are also ideal in new construction. In fact, builders using these products to seal potential future leaks prior to insulating will create an overall better, stronger, and more airtight building envelope.

