



Choosing a High-Performance Sealant

by Bruce Sullivan

Ten years ago, caulks and sealants were part of a home's exterior weather barrier. Today, high-performance sealants are also used inside the house to keep conditioned air from escaping. This column looks at the best three sealants for residential air sealing: siliconized acrylic latex, silicone, and one-part polyurethane.

Quality Counts

Applying sealant is one of those jobs where skimping on quality will come back to haunt you later. The reason is the high level of stress found in most construction joints and the ease with which they can fail. A good sealant will stretch or compress as much as 25% of the original joint size. That exposes a 1/2-inch-wide joint to potential failure

after a movement of only 1/8 inch—an amount that can be created by lumber shrinkage alone. Remember, too, that many air leakage sites can only be sealed during construction, as is the case with the joint between a wall bottom plate and the subfloor. That makes long-term durability important. Some products are called “30-year” or “20-year” sealants. But these terms are useful only when comparing products from the same manufacturer; they don't mean that the sealant will last 20 or 30 years. Specifications, not marketing labels, are the way to judge a product. (By the way, putting sealant *beneath* the plate does little good, since the walls squash the sealant to almost nothing; instead, run a bead between the plate and the floor

after the walls have been framed).

Siliconized Acrylic Latex

Acrylic latex is the most popular sealant for residential work. It's easy to apply and clean up, sticks to most building materials, and doesn't give off toxic fumes. It's also paintable. Although the best acrylic latex sealants are enhanced with silicone to increase flexibility and improve adhesion, the word “siliconized” doesn't in itself mean much. Manufacturers vary widely in how much silicone they use.

Problems with acrylic latex include the fact that it shrinks a lot (15% to 30% by volume) and becomes stiff when cold (don't use it below 40°F). It's also inappropriate for below-grade, underwater, or damp areas. It's only moderately flexible, stretching 10% or 15%, so it shouldn't be used for sealing high-movement joints. Finally, the long-term performance of acrylic latex is uncertain.

Because of these limitations, acrylic latex should be used only where it's easily replaced, such as around window and door casings. If possible, you should also use a colored acrylic latex sealant rather than a clear one. The pigments reduce shrinkage somewhat by raising the solids content of the sealant.

Silicone

Silicone costs more than other sealants, but that's not surprising given its performance characteristics. It's capable of between 25% and 50% joint movement, stays flexible for years, and won't dry out and lose flexibility when exposed to ultraviolet radiation (that's why it's the first choice for the demanding job of sealing site-built glazing). It can endure large temperature swings, is easier to use in cold weather, and won't shrink or harden with age. Most brands don't hold paint, however, so silicone isn't the best choice for exposed joints. It's also hard to work with and doesn't leave much time for tooling. Silicone doesn't stick well to wood or concrete. And cleanup requires mineral spirits or chemical solvents.

There are two types of silicones: acetoxy-cure, which has a strong vinegar smell, and neutral cure. Acetoxy silicones are the most common but they create an acid that corrodes many building materials. That's why you're better off with a neutral-cure product. Two examples are Pecora 864 (Pecora Corp., 165 Warnold Rd., Harleysville, PA 19438; 215/723-6051) and Baysilon 400 or 900 (Miles Inc., Mobay Rd., Pittsburgh, PA 15205; 412/391-5500).

Polyurethane

Polyurethane is the best all-around sealant that I know of. It's durable, has excellent movement capability, will stick to most surfaces (including wood and concrete), shrinks very

little, is paintable, and may not cost much more than a good acrylic latex. It lasts at least as long as silicone, expands and contracts up to 25%, and has a larger maximum joint size than acrylic latex or silicone. In fact, some products will seal cracks as big as 2 inches wide by 1/2 inch deep.

I recommend using polyurethane for large gaps and in places that will be covered up after construction. That includes everything behind the drywall: along the joint between the bottom plate and the subflooring, and around plumbing vents, supply pipes, and electrical wires. Some polyurethanes can even be used below grade; they're the best material for sealing concrete against radon.

Because polyurethane doesn't adhere well to glass and may degrade when exposed to ultraviolet light, it shouldn't be used around glazing. It's also a little messier to use than silicone or acrylic latex. Tack-free time is longer, and cleanup requires chemical solvents.

Evaluating Products

One way to judge a sealant is to contact the manufacturer to get a copy of the product's technical data sheet (see “Reading a Technical Data Sheet”). A shortcut is to make sure that it meets the appropriate ASTM standard. These standards distinguish professional from consumer-grade products and are referenced in the product literature. A good polyurethane or silicone will reference ASTM C920; the standard for latex is ASTM C834.

The best acrylic caulks that I'm familiar with are DAP 230 (P.O. Box 277, Dayton, OH 45401; 513/667-4461) and MD35, MacLanburg Duncan's 35-year caulk (P.O. Box 25188, Oklahoma City, OK 73125; 800/654-8454). These products perform almost as well as polyurethane.

Three good polyurethanes are Sikaflex 1a by Sika Corporation (P.O. Box 297, Lyndhurst, NJ 07071; 800/933-7452), Vulkem from Mameco International (4475 East 175th Street, Cleveland, OH 44128; 800/321-6412), and PR 255 from Ohio Sealants (7405 Production Drive, Mentor, OH 44060; 216/255-8900). Sikaflex has a very good reputation among the contractors I know, while Vulkem costs about the same as a good acrylic latex. It also has excellent flexibility over the long haul.

PR 255 is the one to use if you live in a hot, dry climate. Most polyurethanes rely on airborne water vapor to cure, which means they may never fully cure in the desert. PR 255 is an oxygen-curing product, so it cures independent of humidity. ■

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Reading a Technical Data Sheet

The numbers on a technical data sheet can look like gibberish at first glance, but they're easy to read when you know what they mean. Here are the ones that are most important for air sealing:

Maximum joint size. Typical values are 1/2 inch wide for acrylics, 1/2 to 1 inch wide for silicones, and up to 2 inches wide for some polyurethanes.

Maximum joint movement. Acrylic sealants will expand or contract to +/- 10% to 15% of the original joint size, silicones and polyurethanes to +/- 25% to 50%. More silicones than polyurethanes carry the higher numbers.

Solids content. The higher the solids, the less a sealant will shrink. Polyurethanes contain over 90% solids, which means they don't shrink much; acrylic sealants can have a solids content as low as 70%, so they shrink a lot more.

Hardness. If a joint will experience traffic, as in exposed concrete floors, the sealant should have a hardness of between 25 and 40. For other interior air sealing work, values from 10 to 30 should be acceptable.

Adhesion in peel. This tells you how well a sealant sticks. It's listed for different types of substrates in pounds per linear inch (pli). A value of at least 5 pli is considered satisfactory. Silicone sticks well to glass but polyurethane doesn't; polyurethane sticks to concrete and wood but not to glass.

Sag or slump. If you're sealing ver-

tical joints, such as those around windows, use a “low-slump,” or “non-sag” caulk. These have a slump value of less than 1/4 inch. On horizontal joints, as when sealing a concrete floor against radon, use a “self-leveling” caulk with a value above 1/4 inch.

Application temperature. Sealants should only be applied within the listed temperature range, unless you take special precautions.

Tack-free time. This is the time required for a skin to form over the surface of the sealant. Most sealants take 30 minutes to several hours to form a skin.

Paintability. Most acrylics and polyurethanes, and even a few silicones, will accept paint. But that's important only if the joint will be exposed. The product literature for paintable caulks indicates how much time to allow before painting.

Cleanup. Acrylic latex sealants clean up with soap and water. Silicone and polyurethane require flammable, potentially toxic solvents.

Shelf life. Sealant shelf lives are seldom more than one year. Manufacturers tend to place expiration dates on cartons, not individual cartridges, so unless you buy sealant by the case, you won't know when it was made. To get a fresh sealant, buy from a large supplier whose inventory turns over several times a year. Water-based products can tolerate only a few cycles of freezing and thawing, so be careful to store them in a heated space.