



# BUILDING IN ALASKA

## Caulks and Sealants Factsheet An Energy Factsheet

EEM-01252

Infiltration heat loss can be up to 40% of winter home heat loss. Most of this occurs through leaky windows and door casings, those intentional openings in our buildings, which are not well weather stripped or caulked. Good sealants and caulks can reduce this easily, effectively and inexpensively. Good air sealing also increases the comfort level in homes.

The word "caulk" is an old boat building term: sealant originated in the homebuilding industry. Today some manufacturers use caulk as an all purpose term and sealant to describe their high performance specialty products. Most often these terms are used interchangeably and all the products serve the same purpose, to fill the gaps or pores in building materials and to keep water and air from penetrating or leaking out.

Much of what we will cover in this caulks and sealants factsheet will relate to new construction, but also it is important to consider sealants if you are retrofitting or rehabilitating an older structure. And it doesn't require an experienced handyman to do the work. But, some of the information, and the diversity of caulks on the market can be confusing and daunting to the novice.

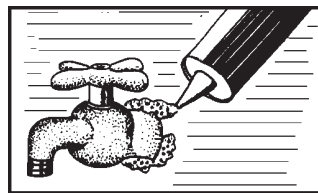
Another important factor is to understand how caulks can fail. By installing them with the best application techniques and with good anticipation of success, you can prevent these failures. The bond between the caulk and the substrate (whatever it's being attached or adhered to) can fail. The caulk itself can tear or the substrate can break. However problems with caulk joints are commonly due to one of two errors. Either the substrate, typically wood or some other

building material, was not properly and effectively prepared or the wrong product was chosen.

Another important consideration for caulking in Alaska is always caulk when the temperature is above 40°F or higher. Although some caulks can set up at cold temperatures and if you have an emergency they can be used, it is always better to have the caulk set up at a warm temperature. Polyurethane caulks can "set" at cold temperatures, but it is still better to apply them when it's above 40°F.

### WHERE TO CAULK

*NOTE: Weatherstripping, NOT caulking, is applied between moving surfaces such as window sashes and frames. Also, use foam gaskets around electrical outlets. Caulking should be used only as recommended by the manufacturer and in places where movement is untypical except for expansion and contraction.*

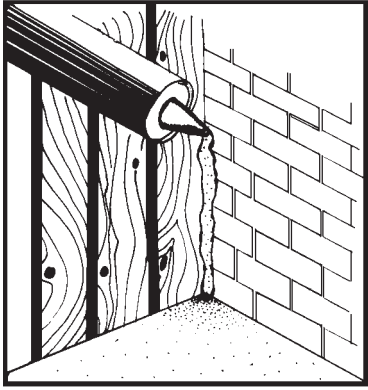


Caulking should be applied wherever two different materials or parts of the house meet but don't move and are not intended to move. These include:

- At the sill where wood structures meet the foundation.
- Where storm windows meet the window frames, leaving weepholes on bottom of outside pane.
- Baseboards, duct outlets, and any penetrations to a home for electrical plumbing or other utilities.

## CAULKING MATERIALS

First invest in a good caulking gun. Caulk typically comes in cartridges and it's often easiest to apply



it with a caulking gun. But there are other means, including small tanks, boxes with expanding foam fillers and caulks, and some caulking materials even come in spray cans or can be applied with a brush.

In order to work or form the joint, a putty knife, even a plastic spoon can be used to make a very good tooled surface to the caulk bead. Expect that a 10 to 11 oz. tube of caulking will fill 20 to 30 linear feet of joint space.

There are many types of caulks, however the following types can meet most of your needs:

First we'll consider **Silicone**. Silicones are the best sealants for glass, metal, and cold weather. So these should be highly considered for many applications in Alaska. However a major caution in silicones is don't use the "acid cure" type. Experienced contractors and builders in Alaska have a phrase that gives a clue to how to judge whether to use a certain silicone. That is, if it smells like vinegar don't use it on bare wood.

There are silicones that are neutral cure and these are the ones to use. Neutral cure silicones absorb oxygen from the air to stimulate the curing process. Although many products have come into the market since silicones were first sold, and other chemistries are outperforming silicones and may even be easier to work with, silicones are still the best product available for many applications. This complicates the decision, but you can rarely go wrong using an appropriate silicone for a caulk application.

Silicone products have been formulated for just about every substrate. Silicone is a bit tricky to work with. It's more difficult to gun and tool than some other caulks and requires solvents to clean it up. And an important note: most silicones cannot be painted. Once silicone is damaged it tears easily and silicone products cannot be repaired by re-

applications because ironically, silicones do not adhere to cured silicones.

Silicone also adheres poorly to one of the most common building materials, wood. On the other hand, its advantages are that it stands up to extreme weather, cures soft and remains flexible. Because silicone is inorganic it's unaffected by ultraviolet radiation and resists mold and mildew. It can be applied at virtually any temperature and can stand up to adverse weather conditions shortly after application.

Again, there are formulations for every substrate, but most importantly silicone adheres to nonporous substrates better than any other sealant, making it the best choice for surfaces such as, glass, metal, ceramic tile, and porcelain. And keep in mind again, that for silicone, clean and dry substrate surfaces are imperative.

Another relative newcomer on the market is **Synthetic-rubber** caulk. These include products like **Sashco Lexel** ([www.sashco.com](http://www.sashco.com)) and **OSI's Quad**. Although they are synthetic rubber, they are not labeled as a particular chemistry like silicone or polyurethane. However they represent some of the most flexible and clearest-curing products on the market. These qualities make them ideal for exterior joints likely to expand and contract.

These solvent-based synthetic-rubber products adhere well to most substrates and can be applied in wet and cold weather, and also resist mildew. The qualities however that set these caulks and sealants apart from the rest are the ease with which they stretch, their ability to stretch without breaking, and their ability to recover. Because they stretch so easily, there's less chance that the bond or substrate will break during joint movement.

Synthetic rubber is also said to have memory. When it is stretched even to extreme length it returns to its original cured size and shape. These qualities make solid based rubber caulks and sealants the best products for use in log homes, on wood siding and roofs, and other joints that encounter frequent movement.

Synthetic-rubber caulks and sealants are paintable with water-base paints and come in clear formulas that cure more transparent than any other caulk. Be

careful because they are also flammable until they cure, shrink significantly, and have a high percentage of volatile organic compounds (VOCs) in them. In fact, in some parts of the country synthetic-rubber caulks don't meet current VOC regulations. Therefore they should not be used indoors without very ample ventilation, if at all.

Next we want to talk about **Polyurethane** caulks. Polyurethane frankly can be dangerous. Polyurethane is stringy and odorous and is also toxic and potentially hazardous to your health. So why would you bother with polyurethane? Well because polyurethanes are the only sealants that can stand up to abrasion. So there is almost nowhere in residential construction that a safer product cannot be substituted except for very high-traffic areas.

Polyurethanes are also curious because they actually cure better if slightly moistened. If you need to seal joints on a floor, on a driveway, or in a garage with frequent foot or vehicular traffic, break out the rubber gloves, the respirator, and the polyurethane sealant.

There are also polyurethane spray foams to fill large gaps and they end up with an R-value of about 4 1/2 per inch. But these foams are tricky to use because they expand as they cure. Polyurethane foams come in low, moderate, and highly expanding formulas, but even minimally expanding polyurethanes can grow up to 300% before they cure.

Spray polyurethane may not be the best choice for a sealant but it is well suited for insulating in narrow spaces such as around windows. It is difficult to apply foam as uniform and complete as necessary for the tight seal required for the building envelope. Some polyurethane foams become solid and even brittle as they cure and age. If there is any relative movement such as the expansion and contraction of vinyl windows, these brittle foams turn into "sawdust-like" dust. Other foam products cure into a resilient, sponge like media that will last indefinitely and will bond to wood and PVC fairly well. Hilti makes one product that is very well suited for this application.

Several foam manufacturers provide a foam applicator that greatly enhances the technician's ability to apply a uniform amount of foam where desired,

as well as reducing the waste of partly used cans with the valve on the can. The applicators have a flow control and shut off valve as well as an easy to operate trigger to start and stop the flow of foam. When a partial container of foam is left the shut off valve is closed and the rest may be used even months later. It is advisable to test the polyurethane foams available locally or discuss with contractors just what product works best. Even with applicator use it is not possible to make an airtight seal around the corners of vinyl windows. Relying on the foam to expand to fill small voids and openings is wishful thinking and a poor practice. The external seal on windows should be made with a single part urethane caulk (i.e., Bostik Chemcaulk 900 or Tremco 830).

There are also **water-base** caulks now available and they are the easiest to work with. They have a smooth, thin consistency and are basically latex products, but also include vinyl and acrylic caulks. They clean up with water, have little odor, and are nontoxic. Water-base caulks adhere well to most common building materials and these cured water-base caulks are paintable.

Performance of water-base caulks however can vary dramatically from one product to the next. There is a wide range of water-base caulk from painter's caulk to elastomeric sealants. Latex caulks can be used for just about any application as well.

Some water-base products are flexible and weather resistant for exterior joints, others are intended to hide only interior seams that are to be painted. These water-base caulks perform best in warm, dry weather. Be careful in rainy situations because although water-base caulks can be applied to moist surfaces, rain can wash them away before they cure fully.

**Butyl** caulks are exceptionally messy and they stretch like chewing gum and have little or no ability to recover. They have an unattractive tarlike appearance. But as far as caulk technology has come, butyl is still the most water-resistant product available. For this reason, butyls remain viable for specific applications. Gutters are a good example of the right place to use butyl caulk. Butyl resists water and because it never hardens completely, butyl can stand up to random movement of a shear joint.

A shear joint is where two substrates overlap. Roof flashing is an example of a shear joint, and another place where butyl is the best choice. Butyl's resistance to moisture also makes it the best caulk to use on foundations or anywhere a sealant may be needed below grade.

Butyl caulk is a controversial option. Some information sources recommend it as a best choice for applications such as rain gutters and roof flashing, such as we quote here. Other users and reports indicate butyl is a *poor*(!) choice for such applications. As indicated on the Canadian Wood Products table included later in this publication, it is reputed to have "low moisture resistance." These claims are diametrically opposed to each other.

While claims that butyl caulks are messy and leave an unattractive tarlike appearance are clearly true, the author's personal experience with butyl caulk is that it has worked well on storm gutters, and for many years. Reports from readers' experiences with butyl caulks are welcome, so that we can get some Alaskan experience into the mix. Please contact the author at [ffrds@uaf.edu](mailto:ffrds@uaf.edu) with your experiences at using butyl caulks, or any of these other options, for that matter.

Modified-silicone polymers like **DAP's Side Winder** and **OSI's Advantage** represent the newest type of sealant available. They are difficult to classify because they combine the chemistry and benefits of water-base, silicone, and polyurethane products into one sealant. They are expensive but worth the money for sealing important outdoor areas like windows, doors, and vents. Like latex and acrylic products, modified-silicone polymers are easy to gun.

Like silicones they can be applied in extreme temperatures and can withstand a rain almost immediately and like polyurethanes, they are incredibly durable and adhere well to almost any substrate material. They are flexible, paintable with water-base paints, but you should use a latex primer before coating with oil-base paints. These hybrids also have a lower VOC content than solvent-based synthetic-rubber products. They cure quickly and don't shrink.

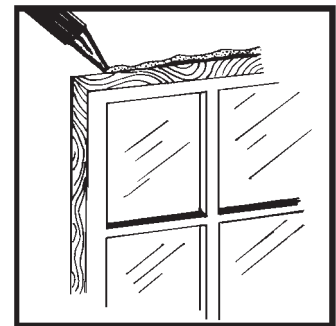
At this point the only uncertainty about the modified-silicone polymers is that they are expensive and new. Although manufacturers put all their products through rigorous testing, modified-silicone polymers

have been on the market for only a few years and not long enough to prove their worth to demanding builders and homeowners, so be careful when choosing these.

Finally, let's talk about **Acoustical Sealants** those materials that are recommended for sealing polyethylene air/vapor retarders, TYVEK® air retarders and other materials to these plastic air/vapor retarders and their substrates. Tremco acoustical sealant, Teno sealant and some other new materials including LePage's Bulldog Grip PL Acousti-seal are all designed to be used to seal polyethylene and other plastic air/vapor retarders to substrates in building situations. The properties of these materials are generally recognized as the best choice for sealing air/vapor retarders of all types. Because of the sticky, tenacious adhesion, and properties of not hardening, fluidity at cold temperatures, and very good adhesive quality it is an ideal sealant for plastics. Solvents for it (an important consideration!) are acetone, petroleum distillate, kerosene and other solvents.

## CAULKING APPLICATION

1. Thoroughly clean and dry area to be caulked with a solvent and putty knife. Solvent for latex is water; other caulking compounds require mineral spirits, acrylic or naphtha.



2. Don't caulk a joint that is larger than the tip of the nozzle of the caulking gun. If the cracks are deep or wide, fill them with a filler material. As a rule, cracks measuring more than 1/2 inch wide or 1/2 inch deep require special preparation with backer rod or expanding foam. Backer rod is a foam rubber rope used to fill larger gaps, e.g., in a log cabin. It comes in 1/4 inch to 1 1/4 inch diameters. Expanding foam is a sealer, not a filler.

3. Cut the spout of the caulking gun at an angle that will give you the proper size bead for the job.

4. Hold the gun at a 45° angle. Make sure the bead covers both sides of the crack. **DON'T SKIMP.** Most people caulk from top to bottom, but you

**TABLE 1 - CAULKS AND SEALANTS FOR INTERIOR USE**

Sealant type (CGSB spec. #)	Typical uses & materials	Joint width and % movement	Advantages	Disadvantages
Oil or resin based (11-GP-6M)	Interior rigid joints	10mm (3/8") 1%	Lowest cost	Low performance, may dry hard, may bleed oils, cannot be painted, lower life span
Acoustical (19-GP-21M)	Interior unexposed joints, polyethylene sheeting	16mm (5/8") 10%	Good workability, good sealing properties, adheres to polyethylene, long life span	Cannot be painted, difficult to clean, non-hardening, needs support
Acrylic latex (19-GP-21M)	Interior finishes and low-movement joints, except metal	9mm (3/8") 2%	Good general purpose caulk, low movement, fast curing, paintable	Apply above 4.4°C (40°F) only, low moisture resistance, moderate flexibility
Vinyl acrylic latex	Interior finishes, porous surfaces such as wood or concrete	9mm (3/8") 2%	Low cost, paintable, (Lower performance than acrylic latex.)	Apply above 4.4°C (40°F) only, poor flexibility, shrinks, low moisture, sun resistance
Thermoplastic elastomer	Interior air seal and finishes, adheres well to most interior surfaces	12mm (1/2") 4%	Good moisture resistance, paintable, minimal odor, clear, long life span	Low elasticity, low resistance to water, sun

Source: Technical Bulletin No. 1, Windows, The National Energy Conservation Association (NECA), Winnipeg, MB

can get better results by caulking from bottom to top and pushing the gun up versus pulling the gun down.

5. Smooth out the compound with the nozzle as you apply it and with a putty knife after application. If the caulking material shrinks after drying, reapply. Make sure the caulking bridges the gap. Trowel and tool the bead with a putty knife, plastic spoon or other surface finish tool.
6. Start at the back of your house and work towards the front. Your skill level will improve when you caulk in places that are visible!

NOTE: Caulking windows on the inside is preferable at all times, due to moisture migration and in-cavity condensation.

## REFERENCES

1. <http://www.taunton.com/finehomebuilding/pages/h00146.asp> Article from "Fine Homebuilding" Magazine, Making Sense of Caulks and Sealants. 6p.
2. <http://www.lepageproducts.com>
3. [http://www.cwc.ca/design/building\\_science/internal\\_barriers/caulks.php](http://www.cwc.ca/design/building_science/internal_barriers/caulks.php)
4. <http://www.factsfacts.com/MyHomeRepair/caulk.htm>  
This is a private/personal website with a good archive of personal experiences rating caulks and sealants for various uses. It includes all sorts of tips for clean-up, storing caulk, testing before use, and problems as well.

**TABLE 2 - CAULKS AND SEALANTS FOR EXTERIOR USE**

Sealant type (CGSB spec. #)	Typical uses & materials	Joint width and % movement	Advantages	Disadvantages
Solvent-based acrylic (19-GP-5M)	Widely used, general purpose exterior sealant	19mm (3/4") 7.5%	Excellent adhesion, good resistance to chemicals (cannot be painted)	Should be applied above 4.4°C (40°F), subject to stains cracks before service life
One-part polysulfide	Large joints, masonry and concrete	19 to 24mm (3/4" to 7/8") 12 to 25%	Excellent flexibility and durability, resistance to moisture, paintable, long life span	Requires surface priming, strong odor during application, toxic to skin
Hypalon	Concrete, metals, wood, masonry	15mm (1/2") 12.5%	Good elasticity, cures to consistency of rubber, paintable	Should be applied above 10°C (50°F), slow curing, unsuitable for most surfaces
Butyl-based (19-GP-14M)	Exterior metal or masonry sealant non-exposed interior	12mm (1/2") 5 to 10%	Very flexible	High shrinkage, must cure 1 week before painting, low moisture resistance*
Silicone (19-GM-18M)	Exterior finishes, some interior uses	25mm (1") 12 to 25%	Excellent performance, good temperature and flexure resistance, long life span	Cannot be painted, high cost, may require surface priming, gives off odor when curing (acid cure)
Thermoplastic rubber	Exterior finishes, interior finishes	13mm (1/2") 50%+	Exceptional flexibility, available in range of colors, minimal odor, long life span	Lowest service temperature specified as -30°C (-23°F), should be applied above 5°C (16°F)
Polyurethane and pre-polymer Type (CAN2 19.13-M82)	Small exterior and interior joints (walls, floors)	12mm (1/2") 25 to 50%	Excellent flexibility and resistance, minimal odor, paintable, long life span	High cost, primer may be required, low adhesive to plastics
Two-part polysulphide	Joint filler, high traffic areas, wet areas	20mm (3/4") 25%	Excellent adhesion, flexibility and durability, long life span	Difficult application from bulk loader, may require surface primer
Transparent removable	Small crack air-sealing, usually interior windows	10mm (3/8") 10%	Low cost, easy application and removal, suitable for most materials	Must reapply each winter, gives off odor while curing, 24 hours to harden, shorter life span

Source: Technical Bulletin No. 1, Windows, The National Energy Conservation Association (NECA), Winnipeg, MB

\* The validity of this claim is in question.

*The use of brand names in this publication does not imply endorsement by the Cooperative Extension Service.*

For more information contact:  
Richard Seifert  
Extension Energy & Housing Specialist  
phone (907) 474-7201  
email: ffrds@uaf.edu

Visit the Cooperative Extension Service website at [www.uaf.edu/ces](http://www.uaf.edu/ces)  
and Rich Seifert's homepage at [www.uaf.edu/ces/faculty/seifert](http://www.uaf.edu/ces/faculty/seifert)



6-85/RS/1000

Reprinted February 2007

The University of Alaska Fairbanks Cooperative Extension Service programs are available to all, without regard to race, color, age, sex, creed, national origin, or disability and in accordance with all applicable federal laws. Provided in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Pete Pinney, Interim Director, Cooperative Extension, University of Alaska Fairbanks.

The University of Alaska Fairbanks is an affirmative action/equal opportunity employer and educational institution.