



Energy Efficiency: Sealing Air Leaks - Caulking

(General)

Air leakage accounts for 20% to 40% of heat loss in a home - not to mention the cost to the environment. So lets look at one method of sealing those leaks.



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What is Caulking

- Caulking is a great method to block air flow between materials that do not move.
- Caulk is any waterproof material that fills and seals joints between building materials.
- Caulks are typically made from a flexible polymer such as latex or rubber because these materials are fully waterproof, can expand with temperature changes and absorb vibrations well.
- It is inexpensive and easy to apply,
- Used between studs, electrical outlets, where plumbing or wiring penetrate through surfaces, in the seams around door and window frames, floor joists etc.

Caulk vs. Sealants

These terms are often interchanged but technically, caulk is more rigid than sealants when dry. Sealants hold up better in spaces that are prone to a lot of expansion and contraction.

Types of Caulk

Silicone Sealants

- Silicone is very flexible and acts as a water and moisture repellent, so they are the best caulk for windows, bathroom fixtures and kitchen sinks. It also comes in different colors.
- Paintable silicone caulk can be used around the outside of windows and doors without causing problems when the area is painted.
- Use outdoors in areas exposed to direct sunlight or rain, as the silicone helps the seal last longer.

- In older homes: Seal where any siding overlaps the foundation to prevent air from entering.
- Cleanup for silicone caulk requires solvents instead of water.

Latex Caulks

- Sometimes known as acrylic latex caulk.
- Not as flexible as silicone.
- Best for use with drywall, wood and masonry.
- Lasts 10 to 15 years but breaks down faster if exposed to water often, so better for interior use.
- Cleans up with water.



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Expandable Foam Caulk

- A polyurethane spray foam insulation comes in aerosol cans that expands to fill larger gaps and holes. There are low-expansion foams to use in tight areas like around windows and doors.
- Use around electrical outlets, exterior pipes, window jambs and cracked foundations. Be sure to use only fire resistant types if around electrical or heating structures.
- This is the best exterior caulk for blocking large pest holes. Use a pest-resistant foam as mice can eat through some types of sealants. (Or you can stuff the opening with wire mesh or steel wool and foam over top of that.)
- If applying outdoors, be sure to use exterior grade foam (usually black in color) and protect it from exposure to the sun, which will cause it to break down faster.



- These cans can only be used once as they quickly clog and are very difficult to clean. Some brands have a special “smart dispenser” which allows them to be used over 30 days. Plan your projects so you can use the can effectively.
- Acetone is used for clean-up but only while it is wet. Once it dries, there is no way to remove it except by cutting or sanding it off. (Water just makes it harden faster.)

Butyl-rubber Caulk.

- A specialty caulk for outdoor use only.
- Best for use with aluminum, metal, concrete, mortar, plastics, rubber, stone, vinyl and exterior wood.
- The best exterior caulk for roofing construction and repairs, since it can withstand extreme temperatures and creates a strong, insulating and water-tight seal.
- Cleanup can be difficult.

CAUTION WHEN USING EXPANDING FOAM



- Flammable vapors are given off when spraying this foam: shut off all pilot lights and sources of ignition during use, even in next room.
- Provide plenty of fresh air or ventilation. Do not breathe fumes as it can irritate the eyes, nose, throat and lungs.
- Cover all skin and wear gloves, safety glasses or goggles and protective clothing. Extremely sticky and difficult to remove: Do not get on skin - it is an irritant. Dried foam sticks permanently to skin and clothing. There is no solvent to remove it. Use a pumice stone to wear it away.
- Unless otherwise labeled, dried polyurethane foam is combustible and will burn above 240°F (116°C). Do not apply around heaters, high heat lamps or recessed lighting fixtures, radiators, furnaces or fireplaces. Do not use foam inside electrical boxes or panels (applications around the outside of the boxes are permitted). Look for specific fire resistant foams for these areas.



Comparing Common Caulking Compounds

Type	Uses	Cleanup	Shrinkage	Adhesion	Properties
Silicon	Seals most building materials - wood, stone, vinyl, metal, brick	Immediately with dry cloth and mineral spirits or naphtha	Little	Good to excellent	Permits joints to stretch or compress. Will stick to painted surfaces. Paint will not stick to cured silicones.
Polyurethane expandable spray foam	Expands when curing. Good for large cracks. Use in non-friction areas (foam becomes dry and powdery over time)	Immediately with solvent (lacquer thinner)	None - expands quite a bit	Good to excellent	Quickly expands to fit larger, irregularly shaped gaps. Can be used at variable temperatures. Must be painted for exterior use to protect from UV radiation.
Water-based spray foam	Around windows and door frames - smaller cracks	Water	None - expands only 25%	Good to excellent	Takes 24 hours to cure. Will not over-expand (bend window frames). Must be exposed to air to dry. Not useful for large gaps.
Butyl rubber	Seals glass, metal, plastic, wood, concrete - windows, flashing. Bonds loose shingles	Mineral spirits or naphtha	5 - 30%	Good	Lasts 10 or more years. Resilient but not brittle. Can be painted after one week. Variable shrinkage - may require two applications. Does not adhere well to painted surfaces.

Do You Need Caulking?

The same techniques to determine whether weatherstripping should be installed or repaired can be used to detect where caulking should be applied.

- If you can see light coming through any place around the area.
- Place a lit incense stick near electrical outlets, switches, light fixtures, where plumbing penetrates, walls, door frames, window frames or anywhere else you may feel a draft. If the smoke is blowing into or away from the area, you know you have a leak.

How to Apply Caulking

- Remove any old caulking, if there is any.
- Optional - Apply painter's tape to mask off areas around the joint where the caulk should not appear. This will give you a straight line of caulk and will improve the final appearance.
- Using a caulking gun, insert the cartridge into the gun frame and make sure it's snug and secure. (Caulking guns are available with a thumb release which will help make cleaner seals.)
- Carefully snip off the nozzle with scissors or a knife at a 45 degree angle.
- Align the plunger against the back of the tube and squeeze the trigger until the caulk is just forced out the nozzle.
- Practice applying a bead of caulk at a 45 degree angle on a scrap piece of cardboard as you pull it backwards.



- When applying, squeeze with enough pressure to force the caulk into the joint while you steadily draw the nozzle along.
- To finish, lightly drag a caulk finishing tool over the bead to smooth it or, you can simply use your gloved finger moistened with warm soapy water to smooth it out.

Applying Expanding Foam

Easy to use but safety precautions are necessary.

- Read the manufacturer's instructions.
- Foam spray is messy, a skin irritant and the cans can leak. Gloves and protective eyewear and clothing should always be worn. (If it dries on your skin, there is no easy way to get it off!) Use a drop cloth as well.
- Using a large, dry paint brush, sweep away any dust or

loose particles in and around the area.

- When the area is clean, spray it lightly with water. Expanding foam needs moisture to cure, so this will help the foam cure evenly.
- Attach the nozzle to the can and shake it thoroughly. Have a piece of cardboard handy for a test.
- Hold the can upside down, and test on the cardboard. Note it will more than double in size once applied.
- Now you are ready to apply it to the area needed.
- You should also avoid placing the cans directly on the ground when not in use. Set on a drop cloth or other disposable material.
- If you've sprayed excess foam, just leave it until it dries. Wet foam is almost impossible to manipulate.
- Immediately after applying the foam, mist it with water. If you apply more than one layer of foam, spray water between each layer to help the foam set.
- Leave the foam to cure fully, which usually takes one hour, depending on the manufacturer's instructions.
- When the foam is fully cured, carefully use a utility knife or hacksaw to cut off any excess.
- Use sandpaper to give a smooth finish. The expanding foam can now be plastered or painted over.

The Problem With Moisture Control

Tightly sealed homes drastically increase energy efficiency, however, as you seal air leaks, you may trap extra humidity inside. You may notice damp drywall, condensation on windows, or mould growth. In this case, you may need to run a dehumidifier.



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According to Energy Star, your home should have between 30%-50% relative humidity. One way to determine the humidity in your home is to perform the Ice Cube Test.

1. Drop 2-3 ice cubes into a glass of water and stir.
2. Wait 3-4 minutes.
3. If no moisture forms on the outside of the glass, the air is too dry (<30% humidity); you may need a humidifier. If a lot of water condenses and drips down the outside of the glass, humidity is too high (>60%).

Keeping an eye on the humidity level is a good idea and simple inexpensive hygrometers can be purchased at most stores that carry thermometers.

Videos

How To Caulk Windows & Doors - The Home Depot
<https://www.youtube.com/watch?v=n7mWJXus654>

How to Seal Foundation Cracks - The Home Depot
<https://www.youtube.com/watch?v=qYxfIqHb1U>

How and where to use Foam Sealant - GREAT STUFF™
<https://www.youtube.com/watch?v=Dir1M2waN3k>