

WHERE SHOULD I SEAL AND HOW?

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The smoke test described in the previous answer should be used to verify the presence of typical leaks and discover those peculiar to your own house. Before sealing, read the section on Ventilation to avoid any future condensation problems.

The leaks high in the house are not necessarily the largest, but they are the most damaging as they deposit water in the walls and attic. The higher the neutral plane, the less problem we have with this "exfiltration."

-- RECESSED CEILING LIGHTS below an insulated attic or roof should simply be removed as current fire regulations will not allow you to insulate or seal them. If you insulate them, they'll burn your house down. If you leave them, they will start a second ice age in your attic. The exception are "Air Tight Ready" fixtures. These have a special double panel that makes them "IC" certified, meaning that you can insulate them without a fire hazard. But that is not enough. They also have to be air tight so no air flows through them. The reason they are called "Air Tight Ready, rather than simply Air Tight, is that they come with a gasket to seal the recessed casing to the drywall or plaster. If you don't do this last step of sealing during installation, they are not air tight and should not be used. They make special renovation models that can be slid into place from below.

-- Every WIRE, PIPE, DUCT and CHIMNEY that goes through the ceiling into the attic needs to be carefully sealed to the vapour barrier, or if there is none, to the ceiling plaster board. (If possible, reroute them elsewhere.) Push the insulation aside and caulk thoroughly.

Hot chimneys must be fire protected with metal flanges and stove caulking.

Plumbing stacks move up and down as much as three inches from expansion and contraction, so some kind of expansion joint is necessary. An expansion joint in the plumbing is often installed below the ceiling, allowing the solid fixing of the portion of pipe that goes through the ceiling. From the attic observe the pipe and have someone run lots of hot water down an upstairs drain. If the stack rises you need a flexible air seal. A neoprene roof flashing to seal the pipe to the plasterboard of the ceiling; or a "boot" of polyethylene sealed to the ceiling and the pipe with lots of loose polyethylene for movement; or greasing the pipe and shooting foam insulation between the pipe and ceiling opening -- are all possible solutions. Fiberglass stuffed into cracks around pipes does not stop air infiltration at all -- it only cleans the air like a good filter. If you want to use it -- or anything else for that matter -- for stuffing to fill a crack, you must then coat the surface with caulking which reaches from the pipe to the ceiling plaster or vapour barrier. The fiberglass only acts as a backing for the caulking.

-- The CRACK BETWEEN WALLS AND THE CEILING (both exterior and interior walls) is best sealed from the attic by caulking the plaster board to the wood headers. This is necessary if there is not a continuous vapour barrier that goes over the headers from room to room. This crack can be the source of a surprising amount of ice over the course of a single winter.

-- Any DUCTS that travel through the attic must be thoroughly sealed with aluminum tape and/or caulking at every joint. Cloth duct tape quickly deteriorates and leaves the joint open. (Sorry Red Green, you need to change for aluminum duct tape.) Exhaust fans should have all holes in their mounting boxes sealed, as well as the crack between the mounting box and the ceiling or wall. No duct should ever terminate in the attic-- you might as well run a garden house up there.

-- Don't forget to weather-strip the ATTIC HATCH. Better yet seal it up tight and make a new entry from outside the house in the gable end if you have a one story house and you won't break your neck on a ladder. On some houses you can get into the attic through the porch overhang.

That should take care of the attic-- or perhaps it was too small to allow you to work up there in the first place. In either case, seal the same cracks again if you have access to them from inside the house.

-- Look for any CRACKS IN THE PLASTER, especially between the walls and the ceiling, or between inside and outside walls, and caulk or plaster them, and then repaint.

-- All ELECTRICAL FIXTURES must be sealed, but note that the electrical codes do not allow you to caulk inside the electrical boxes. If you are involved in new construction, use "air tight electrical boxes" which have no holes in them and allow for complete sealing of the wires coming into the box. If you don't have the luxury of new construction, you may be able to find rubber inserts that slid inside existing electrical boxes and then the fixtures are put back in. If you can't find these, then caulk the rim of the electrical box to the plasterboard ceiling or wall. Then install inexpensive electrical outlet gaskets made of foam rubber. These are placed over the electrical box and held in place by the cover. It should fit snugly against the caulking around the edge. If the right size of electrical gaskets are not available, cut one out of neoprene rubber or a thin, air-tight foam. These gaskets are not perfect seals but they greatly reduce a serious air leak. All electrical outlets, whether in the ceiling or walls, should be treated this way because air moves through inside walls into the attic as well.

-- INTERIOR WALLS should be sealed as carefully as exterior walls, as they are surprisingly good routes for air infiltration between the house and exterior walls, and the attic as well (unless you have a modern, energy-efficient house with a proper air-vapour barrier that isolates these walls inside the house). Electrical plugs, ceiling cracks, baseboards and door frames should all be treated.

-- Seal between MASONRY FIREPLACES and the walls.

-- The frames of WINDOWS and DOORS are problems (see "weather-stripping" found in the Nuts & Bolts section of this site sealing the moving parts). Remove the trim from one window to see what has been done before you. If there is a sheet of plastic that extends from the wall and across the crack to the finished window frame, effectively sealing off all air leaks, good -- close it up and forget about your windows and doors. If the plastic isn't there, either bridge the gap between the two frames with plastic caulked to each frame under the trim, or use polyurethane foam to seal the crack. Be careful, if you fill the whole frame space with regular expansive foam, it can jam your windows closed. Fill the space with fiberglass and then foam the last inch. (Professionals use a special non-expansive foam that allows them to foam the entire space.) Fiberglass by itself is not an air barrier -- it must be covered by plastic, tape, caulking or foam to get that air tight seal.

-- Cracks around KITCHEN and BATHROOM VENTS to the outside need to be sealed as well. Ensure that the fan mountings and ducting through the wall are air tight.

-- Kitchen and bathroom PLUMBING PIPES should be sealed at the wall.

-- The JOINT BETWEEN THE FLOOR AND THE WALL is an important one and, although often impossible to seal perfectly (especially with plank, flooring) it can be tightened up. Remove the baseboard if possible or if not practical at least remove the quarter round trim. If the crack is too large for a simple bead of caulking, stuff it first with oakum or fiberglass and then caulk or foam over the surface to join the wall to the floor. Replace the baseboard while the caulking is still wet and it will slip nicely into place. (If you wait, the lumps will drive you crazy.) Don't forget to do the partition walls as well.

There is more to do in the basement than you might imagine.

-- 20 percent of air leakage for the whole house comes from the joint between the wooden structure and the concrete wall -- the SILL PLATE. In new construction, this is sealed with a special foam gasket. If you're rewinterizing, carefully caulk between the concrete and the wood all the way around the house on the INSIDE. The joint between the floor boards and the wooden header can also be caulked at this time.

Where joists rest in concrete, caulk them to the concrete to help prevent moisture exfiltration into the cavity left by wood shrinkage over the years. (What diffuses out through the concrete will keep on going.) If fiberglass has been stuffed into the header space it must be covered with something to prevent condensation buildup against the cold header. The best is polystyrene sheets (like Dow Styrofoam) fitted and caulked to the joists and floor boards. But surprisingly enough, a simple sheet of Kraft paper jammed over the fiberglass and not even caulked does the trick and prevents moisture accumulation. It's lousy in theory but it works just fine except in areas of extreme cold.

-- VENTS, PIPES, CONDUITS and WIRES -- anything that leaves the basement to the outside or up into the walls must be thoroughly caulked. (What can't get into partition walls from below in the first place, can't get out into the attic or exterior walls either.)

Keywords:

Caulking, Wire, Drywall, Air Sealing, Polyurethane, Doors, Renovation, Sealing, Windows, Air Barriers, Baseboard, Ceiling, Seals, Air Leakage, Outlets, Sill, Boots, Foam, Fixtures, Basement, Cracks, Exhaust Fans, Chimney, Attic, Duct, Plumbing

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