

# Continuous exterior insulation for buildings

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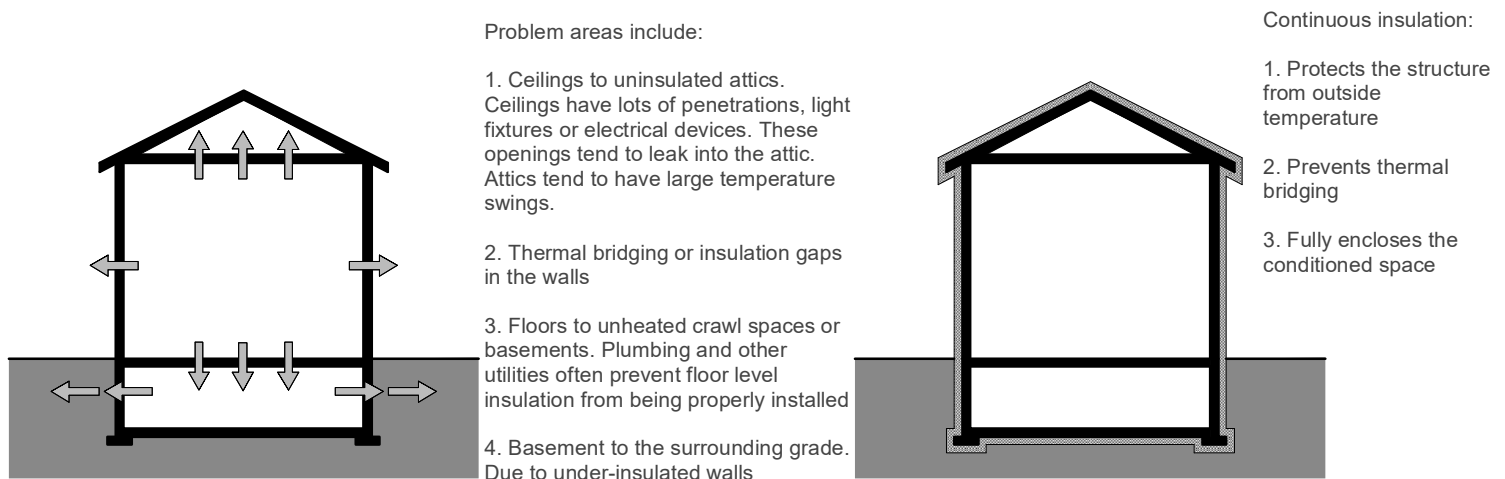
Building codes requiring exterior continuous insulation are a rather new development; some jurisdictions still do not require it. It has long been the standard to put fluffy fiberglass batt insulation in the walls. While batts help keep the interior warm, they leave a few things to be desired. Including exterior insulation on your buildings can help increase performance and comfort, as well as save energy.

## Problems with not using continuous insulation:

Insulating with traditional between the studs batt insulation only can lead to several problems. One issue is thermal bridging. This occurs when the studs get cold on the outside, and then transmit that cold to the inside of the building; this is worse with metal studs but happens with all framing. Dense framing at corners or around openings can also reduce insulation capacity. Several jack studs at a window opening or a building corner which is all studs with no insulation cavity space can reduce the thermal performance of the building envelope.

How non-insulated spaces are separated from conditioned space can cause problems. Typically attics and crawl spaces are not insulated; being directly vented to the outside with insulation being placed at the floor or ceiling level. HVAC and utilities are often in these non-conditioned spaces. Freezing pipes in the winter is an obvious problem. Ductwork in these areas is often uninsulated or poorly insulated. If you have the A/C ducts in an uninsulated attic, 100 degree summer heat is not helping with the equipment efficiency; you are losing cooling capacity to your attic. Attics also have an issue with recessed lighting creating holes in the ceiling, letting all the conditioned air back out into the attic. Crawl spaces have similar issues; especially when its typical to leave them open and ventilated to the exterior. If you don't want the outside air in your house, you really shouldn't want it in your crawl space either. In the south, summer air is hot and humid, so much so that it can lead to mold problems; this could be avoided by conditioning that space. If you try and insulate at the floor level; there are lots of plumbing penetrations to seal and work around. Ever peek in an old crawl space? Is all the insulation intact and in place, not likely.

Improper installation can also be an issue. How can installation go awry? You just put insulation in the walls. Batt insulation comes in certain thicknesses, and it needs to stay that thickness; the air it retains helps provide the insulation. Have you ever seen any small gaps or cracks, maybe around openings or penetrations where someone has just shoved batt insulation in there? That just ruined the insulation capacity. Squishing the insulation removes the air, and reduces insulation capacity. They should have spray foamed any small gaps instead.



## Challenges with continuous insulation:

Continuous insulation isn't without specific challenges. There are some detailing issues: windows, eaves, and vapor barriers to name a few. It is best to consult a professional in your area for proper local practices.

Most residential windows for wood construction come with a nailing flange, this expects the siding to go right on top of the sheathing. When you add two inches of rigid insulation to the exterior your details around your windows have to change.

Roof construction needs more consideration also; this largely relates to shingles and the warranty. Shingle manufacturers are a little behind the times, they expect the traditional construction method of insulating at the ceiling and keeping the attic ventilated to the outside. This is also a problem for any room with a cathedral ceiling. The manufacturers typically want ventilation directly under the sheathing, else it will void your shingle warranty.

How do you ensure your weather resistive barrier (WRB) is continuous around all your opening framing and roof connections? This is difficult to do with paper WRBs. There are a number of stick on or roll on WRBs which are arguably better performing and better suited to this new detailing. Roll or spray on WRBs have the benefit of easily conforming to any shape as well as being able to be touched up to ensure continuity.

Insects or termites may pose a problem with continuous insulation at ground level. This is similar to brick cavity wall, which can provide passage for insects. While insect don't eat insulation they can easily tunnel through it. Some options are bringing the foundation insulation inside, using rock wool insulation, spraying insecticide, using insecticide treated insulation, or providing proper detailing with a termite shield. The right solution may depend on your location and design goals.

### Benefits of continuous insulation:

If you are interested in including exterior insulation in your next project, what do you get for your effort?

Increased thermal performance. This will help with heating and cooling; its an all year benefit. It will work for you if you're in a warm climate or a cool climate.

Continuous insulation will reduce thermal bridging; being on the outside it will keep all the framing members insulated. In winter have you ever put your hand against the wall under the window, where the window sill framing or jack studs are located and it feels cold; that problem with thermal bridging should be reduced or go away with continuous insulation.

Increased thermal performance in turn translates to two other tangible savings. Lower monthly heating and cooling bills and lower initial cost for a smaller HVAC system. That's right, better insulation may let you install a smaller system; it will cost less going in, and it will cost less to operate in the long term. More insulation means you are retaining more of your conditioned air, so the HVAC system doesn't have to run as frequently.

Adding insulation is a one time cost, you pay for it once and then reap the benefits over the lifetime of the building. You see the savings every month.

More comfortable floor temperatures. Most noticeably for slab on grade installations, also for flooring above basements or crawl spaces, may have greater thermal comfort. No more cold feet in the winter.

Depending what type of exterior insulation you use, you may have a lot more peace and quiet. Rockwool insulation helps improve acoustic performance; if you wrap your building in a blanket of Rockwool it will help block exterior noise.

### Conclusion:

We've covered some of the benefits and challenges of exterior insulation. Hopefully this helps show how adding exterior insulation to your projects can lead to better thermal performance and long term cost savings. Understand that while building codes of the future may mandate various amounts of continuous insulation; providing it voluntarily now has benefits to the building owner or users.

Currently I am designing my own house and including exterior insulation. This is something I believe to be worth doing in construction projects. I am looking forward to lower utility bills as well as the noise reduction.

### Qualifications:

Chris Duff Dufresne RA

Bachelors of Science in Building Science, Bachelors of Architecture from Rensselaer Polytechnic Institute

Registered architect with more than twenty years of experience

Offset Condition Architecture and Design

[www.offsetcondition.com](http://www.offsetcondition.com)

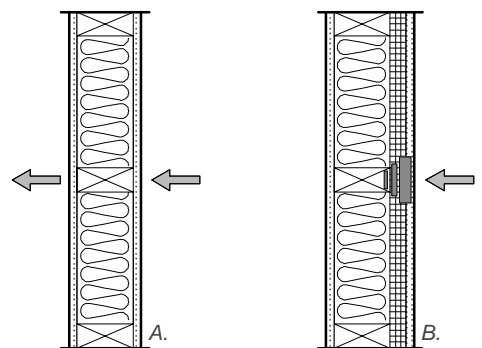
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A. Without continuous insulation thermal bridging occurs

B. Continuous insulation help protect the structure and prevent thermal bridging