

Ask Jon Eakes

Insulating a Cathedral Ceiling - OVERVIEW

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Hello Jon,

I have a cathedral ceiling with a shingled roof. If I insulate the roof air tight, will the shingles lift and curl as they do on poorly ventilated roofs?

The other thought is leaving an 1 1/2 inch space between the roof deck and the insulation and installing a ridge vent, which gives me more work?

Frank

Cathedral problems

“If I insulate the roof AIR TIGHT...” -- there are two problems with this: first it is very difficult to get such a roof really air-tight so that NO moisture can get in, and at the same time you are almost guaranteeing that any moisture that does get in cannot get out. This is done in the far north with sandwich panels (plywood, foam insulation, plywood) made in a factory – but even here there have been many failures where the panels are not perfectly sealed at the joints or penetrations. They turn into soggy sandwich panels. Second, the asphalt shingles will have no air cooling from underneath and they will get hotter than with a ventilated space below. Generally hotter is not the problem, but hitting high temperature peaks for a few minutes with a high summer sun can boil the asphalt out of the shingle, up and over the UV protective granules and begin the rapid degradation of the shingle – as you note, the symptom of that is curling shingles. <http://joneakes.com/jons-fixit-database/1036-Why-do-shingles-cup-and-curl-long-before-their-warranty-date-And-what-is-CSA-certification> So although spraying polyurethane foam into this space from below could get it air tight, you still subject the shingles to high peaks of heat which will invalidate their warranty.

Continuous ventilation

The ridge vent combined with continuous soffit ventilation is the standard answer that works: <http://joneakes.com/jons-fixit-database/2033-Ridge-vents-for-snow-country> The key here is continuous ventilation everywhere – which means working around roof penetrations, like chimneys and skylights, with sidewise paths for the rising air. The insulation must be kept away from the underside of the roof deck and the soffits kept open from the bottom. So the biggest problem of doing this with an existing cathedral ceiling is you must cut into the insulation space from either the bottom of the top and batt or loss fill insulation will not stay in place (avoiding blocking the air passage) without installing a full baffle (Soffit to ridge vent) system to keep that air space open. A full baffle system is also necessary to hold back polyurethane foam.

Add a new ventilated roof

A third option which avoids all indoor renovation, if you are thinking of changing your shingles at the same time, is to simply raise the roof. That would imply probably removing the present shingles, although they could be left if they do not present a weight problem. (two layers of shingles is ok on a roof but three is pushing the weight limits). 2x2 strapping vertical on the roof – this gives you that 1-1/2” air space very equally. Continuous roof edge or soffit ventilation into this air space with a ridge vent on the top. This method has the advantage of working from the top, not exposing the house to rain during construction, and allowing you to do anything you want for the insulation below the old roof. Just think of the old roof as wall sheathing and the new roof as siding with a rainscreen space: <http://joneakes.com/jons-fixit-database/910-what-is-a-rain-screen-wall> The advantage of this tactic is that you can cut many holes into the roof from above for installing or blowing in insulation – and no complicated air space control is necessary. In fact, technically (if you are faster than the rain) you can leave these holes open leading from the insulated section into the ventilation channels between the two roof decks. All the waterproofing is done on the top of the new roof deck and the vapour barrier us just behind the ceiling drywall – or if you don't have one, paint one: <http://joneakes.com/jons-fixit->

database/1614-Vapour-barrier-paint-it-does-exist-it-does-work .

Do it all from inside the house

Actually there is a fourth option if you would rather renovate from below. Simply add about three inches of Styrofoam over the existing ceiling, drop any electrical fixtures flush to the new ceiling, caulk all insulation joints and penetrations to create a vapour barrier and then cover that with drywall. Using Dow WallMate or a similar product that is made for flush 2x3 strapping in the panels gives you drywall nailing and a minimum space loss. This animation shows using this product in a basement, but you can do the same thing on the ceiling: <http://joneakes.com/jons-fixit-database/300-Full-height-basement-insulation-An-animation-explaining-why-the-answer-is-YES> Generally it comes in 1-1/2" panels, so place the first layer on perpendicular to the ceiling joists for easy screwing of the strapping, then the second layer perpendicular to the first set, again easy screwing. Don't bother with the typical Québec air space between the drywall and the insulation – no-one anywhere outside of Quebec bothers with that – it's a cultural thing, nothing to do with building science. If you don't have a ridge vent presently, I would recommend that you add one, which you can do without replacing the shingles.
jon

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