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Eliminating Attic Vents

By: BUILDER Staff

Q: Can unventing and insulating an attic solve interior moisture problems?

A: By creating A path for air to move, structural vents are supposed to prevent the buildup of moisture in an attic. But a vocal group of building scientists says that, in hot and humid climates, vents will likely draw moisture into the house. And because vented attics aren't insulated, they get very hot in summer and very cold in winter. If ductwork runs through the space—as it does in many homes—those extreme temperatures can make the HVAC system work overtime in any climate. And because ducts are notoriously leaky, they will be heating and cooling the great outdoors.

This group says that it's better to seal and insulate the attic, making it part of the home's conditioned space. This will reduce mold and mildew problems and save energy by keeping conditioned air leaking from the ducts inside the house.

Unvented attic proponents have just won the blessing of the code authorities, with a recent change to the International Residential Code (IRC). The change allows unvented roof assemblies if two conditions are met: there's no vapor retarder between the attic and the home's living space, and the builder insulates between the rafters with air-impermeable insulation. (Most moisture gets into an attic via air movement, not by diffusing through materials.) “We want to keep the living space and the nonhabitable attic space at the same moisture conditions,” says Armin Rudd of Building Science Corp. in Westfield, Mass., who helped write the new code language. The new language will be included in the 2006 version of the code. Expect it to show up in local codes 12 to 18 months later.

Not surprisingly, the code change faced some opposition. Earlier this year, the Asphalt Roofing Manufacturers' Association (ARMA) petitioned the International Code Council to repeal it. Dave Roodvoets of DLR Consultants in Westerville, Ohio, who represented ARMA, says that sealing the attic and insulating

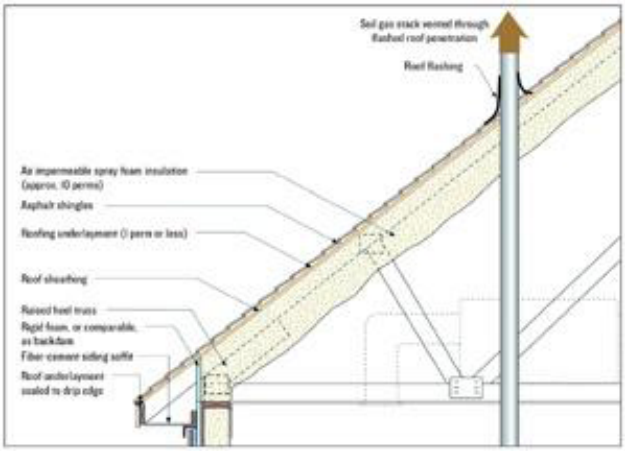
the roof could actually make a home more susceptible to rot by trapping moisture inside. “Ventilation compensates for a lot of sins,” he says. And he claims that proponents of the change don't have enough research to justify it: “Even the best researchers have only a few years of data on unvented attics in humid climates. My experience in roofing is that it takes five to 10 years before you know what's happening in these situations.”

ATTIC EXPERT: Armin Rudd of Building Science Corp. in Westfield, Mass., helped write a code change to allow unvented attics.

Some have charged ARMA with being less worried about moisture than about market share: The requirement for air-impermeable insulation means spray foam, which competes with the fiberglass insulation that some roofing manufacturers make. Roodvoets dismisses the charge. “It has nothing to do with the type of insulation,” he says. “Manufacturers have just seen too many instances where moisture trapped in the attic causes damage to the house.” He says that one shingle manufacturer (which he declined to name) did an experiment on homes being reroofed. It covered the roofs with a bituminous membrane and didn't vent it. Roodvoets claims that mold appeared after a few months, then disappeared when the attics were revented. He concedes that unvented attics may work when properly detailed, but says there's too much room for builder error. “They're not ready for prime time.”

Rudd says there's no evidence that sealed and insulated attics trap moisture. He says that researchers have found that, in hot, humid climates, buildings with unvented attics are actually less likely to have condensation and mold than those with vented attics. That's because, in these climates, most moisture comes from outside, and the foam keeps the attic dry by sealing that moisture out.

Humid attics wouldn't be so bad if it weren't for leaky air-conditioning ducts. Depending on the pressures in the HVAC system and the pressures in the house created by that system, these leaks can blow cold air into the attic or suck hot, humid air into the ductwork and into floor and wall cavities. Either way, you have a problem. Air leaking from the ducts can cool nearby surfaces enough that humid attic air condenses on them. Moist air pulled into the ductwork will get blown into the living space, where it can condense on walls and ceilings. Rudd says he has seen none of these ills in homes with sealed and conditioned attics (conditioned by means of passive connection to the living space). “When we started using spray foam, we were able to solve these problems,” he says.



UNVENTED ATTIC: The new International Residential Code language allows unvented attic spaces, as long as the roof is insulated with air-impermeable foam and there's no vapor retarder between the attic and the living space.

As for the likelihood of mistakes, Rudd points out that foam contractors are trained and certified by insulation manufacturers. And while he can only point to five years of measured data, he says there have been no reported problems with unvented attics built in Florida as long as 10 years ago. “It's a proven building technology,” he says. As for Roodvoets' experiment, Rudd says that it's meaningless without more detail. “We publish the data from all our experiments, but they have yet to show any data.”

But what about cold climates? There, the temperature and moisture difference between inside and outside makes moisture more likely to diffuse through building materials. To stop it, builders up north will have to use a foam that's air- and vapor-impermeable—either a closed-cell foam or an open-cell foam covered with a vapor-retarder paint. (For a comparison of open-and closed-cell foams, see “Bubble Wraps,” September, page 67.)

ARMA 2005's repeal was shot down at the IRC annual meeting in March 2005. Roodvoets says the association hasn't decided whether to continue the fight, but he isn't hopeful about repealing the new language. “It seems to have strong support among code officials.”

RETURN VISIT

Readers ask our experts for follow-up information.

Q: I'm a computer-aided drafter at United Builders in Yakima, Wash. I'm very interested in the research on closed crawlspaces (“Closing the Crawl,” October 2005, page 87). We live and do most of our building in an area that has very cold winters—20 to 35 degrees. We have summers that range from 70 to over 100 degrees. Could you let me know when and where the testing for crawlspaces is happening and how I can follow what the research is showing? Thank you.

Lesley Holt

YAKIMA, WASH.

A:*We are in the process of starting a new project that will test closed crawlspace designs in three climates: the Pacific Northwest, the Midwest, and the deeper Southeast.*

For the Pacific Northwest site, we are targeting the more-humid marine environment, so it may be that we don't end up doing any testing in what appears to be the drier/more extreme climate of Yakima. However, there is a researcher—Mike Lubliner at Washington State University—who is doing closed crawlspace research in your state and who might have some test houses in your climate. He can be reached at lublinerm@energy.wsu.edu.

Our new project will generate data during 2007, with final results published in 2008.

Cyrus Dastur

ADVANCED ENERGY

Q: What would you do here? My home is 30 years old. It's a tri-level split, with the basement at street level. The mid-level is backfilled. Below that is my crawlspace, which is thus at street level. We had big-time mold and dampness problems. I just had concrete poured over the pea gravel. They sprayed bleach over the pea gravel and then put down a vapor barrier. The moisture issue has gotten better, but it still exists to some degree. I would like to treat this space like I would a basement: remove all of the insulation under the floors and along the adjacent downstairs walls and over the ductwork, then install one or two diffusers in the supply line and regulate the temperature down there. Of course, I would seal up the crawlspace vents. What do you think? Isn't it really just like a basement now? Do I need insulation anywhere? If I do need insulation, where should it be? Should it be kraft-faced? Please help, and thanks for the article on crawlspaces (“Closing the Crawl,” October 2005, page 87).

JAY

WHEATON, ILL.

Q: I am a builder in Columbus, Ga., and I have a major problem at my own home. I have just taken all batts out from under the house and installed fans. I was getting ready to foam the crawl. What do you think of foam between joists? Also, is it possible to get a copy of your study? Thank you.

EDGAR HUGHSTON

COLUMBUS, GA.

A:*These questions highlight two of the potential complications of retrofitting a closed crawlspace: choosing a long-term drying mechanism and choosing how to insulate or reinsulate. While it is impossible to provide a diagnosis or design recommendation without more detailed information, I would like to point out some of the most important issues to keep in mind. The primary concerns in a retrofit situation are to ensure (1) that closing the vents does not introduce a combustion safety hazard (are there any appliances that are using air*

from the existing crawl-space for combustion?); (2) that closing the vents does not create or worsen a radon hazard; and (3) that any existing moisture sources are repaired prior to closing the crawlspace. Installing supply vents in a crawlspace is a proven technique for moisture management, but supplying too much air to the crawlspace without makeup air for the return could reduce combustion safety in other parts of the house.

With regard to insulation, our research in North Carolina shows that you can achieve great performance by either insulating the floor structure above the crawlspace or the perimeter wall around the crawlspace. We do not yet have data on which approach is better, with regard to energy savings, in colder or warmer climates like Illinois or Georgia, but our current research project should provide those answers in about two years. In either case, the insulation strategy chosen should comply with current local code requirements for location, fire safety, and R-value and should be installed in a manner that does not increase the risk of a termite infestation. Local institutions, such as the Illinois Building Research Council (http://brc.arch.uiuc.edu) or Atlanta's Southface Energy Institute (www.southface.org) can provide guidance on these issues. Using foam insulation between the joists is a method we have not tested, but it can be more effective than other options, particularly if the floor is framed with open-web trusses or I-joists.

Since there is far more to these issues than can be covered here, I recommend that interested readers visit our Web site (www.crawlspaces.org). We have posted a free guide to closed crawlspaces, including a discussion of recommended designs, special concerns for existing crawlspaces, research summaries, and product manufacturer links to help consumers and builders address the issues of combustion safety, radon risk, insulation, and pest management.

Cyrus Dastur

ADVANCED ENERGY

If you have a question regarding any of our Housecall topics, send it to us, and we will pass it on to our experts.

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