

Beware the Flat Roof

It calls up a whole new breed of moisture problems.

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In my part of the country, flat roofs are common on many three-family houses built around the turn of the century. They are ubiquitous on low-rise retail and office buildings. And they turn up on the occasional single-family.

I learned about flat roofs the hard way on a fire job I took early in my building career. My partner and I agreed to put in two skylights and installed them as we had always done on sloped roofs. Needless to say, the skylights leaked like sieves no matter how much roofing cement we heaped on. My partner's uncle, who was in the roofing business, bailed us out, but he socked us with a hefty bill—to teach us a lesson, he said. I'm not sure if the lesson was, "beware of flat roofs" or "don't hire relatives."

It's a fact that flat roofs demand careful detailing and good workmanship. While they can offer 20 years or more of problem-free service, a small oversight can mean a big leak. They also face potentially serious condensation problems.

The most common roofing leaks occur at flashings and penetrations—up to 90 percent, say industry spokesmen. The leaks are due to poor detailing, poor workmanship, or abuse by other tradesmen working on the roof. Flashing details that aren't designed to absorb movement account for many leaks. Other problems are lack of expansion joints or counterflashing where needed. Relying on sealants and caulks at joints and flashing terminations is asking for trouble. Another common problem is insufficient slope resulting in standing (then leaking) water. Flat roofs should never be built dead level.

Insulation and moisture

While an experienced and conscientious roofer can usually keep rainwater out, water coming up from the inside in the form of vapor can be more troublesome. The usual rules about insulation and ventilation don't apply.

There are two basic approaches to in-

ulating flat roofs. The first, shown in Figure 1, has the deck, rigid insulation, and roof membrane all tightly sandwiched together in a compact system. These roofs have few condensation problems for two reasons: first, there is little air movement in the roof system to pump moisture-laden interior air into the roof; and second, the deck and rigid insulation form a reasonable interior vapor retarder.

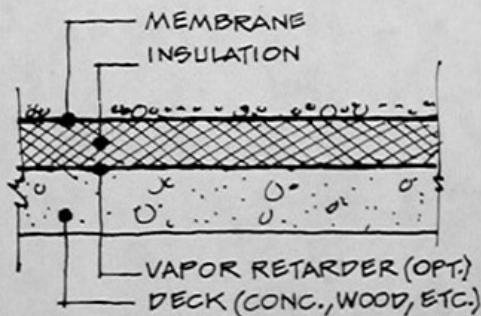


Figure 1. This common commercial roofing system sandwiches rigid insulation between the deck and roofing membrane. Such compact roofs have few condensation problems.

Fear of condensation problems, though, has led some roofers to add special breather vents to these compact roofs. These vents install on the surface of the roof and go through the roofing membrane into a hole cut out of the rigid insulation. Although they are recommended by the National Roofing Contractors Association (NRCA)—one vent every 1000 square feet is specified—NRCA technical manager Jeff Lowinsky admits that the vents are controversial. Building researcher Wayne Tobiasson, who has studied flat roofs extensively at the U.S. Army Corps of Engineers Cold Regions Research and Engineering Laboratory (CRREL), goes further and says that the vents are "foolishness," particularly in roofs without vapor retarders. In these roofs, Tobiasson says, if the vents do anything, they will create problems by inducing airflow up through the ceiling from below.

On the question of vapor retarders, Tobiasson says that roofs with non-permeable insulation tightly sandwiched between the deck and roofing membrane are usually free of condensation problems, except in the far north or in buildings with high

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