



COLD CLIMATE HOUSING RESEARCH CENTER

CCHRC

1000 Fairbanks St.
P.O. Box 82489
Fairbanks, Alaska 99708
(907) 457-3454
(907) 457-3456 Fax
www.cchrc.org

ENERGY FOCUS

Snow Accumulation on Roofs: When to Worry

By Adam Wasch, Energy Outreach Consultant for CCHRC and CES

Last summer, I had a small deck built onto the back of my cabin. From there I enjoy a pleasant view of real woods instead of my neighbor's yard, which is filled with artificial Christmas trees – a collecting hobby of his. My deck does me no good in wintertime, though. It's covered with snow. So much snow that I got to wondering how much it can carry.

Snow loads vary across Alaska, depending mostly on where you live. For example, winter snow loads can reach as high as 300 pounds per square foot in Whittier, but be as little as 25 psf in northern Alaska. Many factors affect snow load including whether structures are subject to drifts, the moisture content of the snow, and seasonal accumulation. If we're talking about a roof, then how well it is insulated will affect how much snow melts and reduces load as a result.

Sloped roofs that periodically shed their snow load present benefits and risks. If snow slides safely onto open ground, there's no problem. But if that snow hits a deck on the way down, its force is multiplied many times more than its resting weight and can shear otherwise stable structures right off if they are not supported sufficiently. Or, if snow slides onto a flat roof or other surface, its cumulative weight can become much greater than that of normal snowfall. Structures should be designed with overhangs or other factors to offer sliding snow a safe plummet to the ground. The ability of chimneys or utility poles to withstand sliding snow should also be considered.

The weight of snow varies. For example, the latest large snowfall in the Fairbanks area was heavier than usual due to high water content. It weighed about 10 pounds per cubic foot. This is light compared to snowfall in the Lower 48, where it can reach 20 pcf or more. The moisture content of snow ranges from about 1 percent to about 33 percent (water weighs about 62 pcf). Compressed snow – even snow that simply accumulates over time, will weigh more than freshly fallen snow. Fallen snow can also pick up humidity from the air and increase in weight.

Building code in the Fairbanks area calls for roofs to withstand a minimum of 50 psf, but this is only a minimum. Homes built before 1991 were required to carry 40 psf; older homes less. Mobile homes can be built to carry just 20 psf. Decks, sheds, and other structures built without permits or an inspection might be inadequate to handle much if any load depending on the quality of the workmanship. Also, you may want to consider an additional safety margin that takes into account a building's use or other special factors.

How do you know if you have a problem? Well, if you're not privy to the design specifications of your home, the safest route is to hire a structural engineer to inspect your home and do the math. An inspection can also reveal potential weak spots or places where your roof structure, deck, or framing might fail. Consider how additions or modifications might affect your home's ability to support snow. Wood tends to be very flexible and can withstand a lot of force over time before it snaps. But, eventually, if it is not built to the task, it will fail. Trouble signs include cracks in your walls and ceilings. Look for doors or windows that seem warped or present difficulty closing.

Clearing excess snow off your roof or deck is not usually required unless you are dealing with an older home, structures that are built to dubious specifications, or an extraordinary build-up of heavy snow. The act of clearing snow can be a dangerous activity – you don't want to place yourself in a precarious situation and fall off your roof. Also, the addition of your own weight on an already stressed roof can make matters worse. If you suspect a roof might collapse (you witness sagging or hear creaking), leave immediately.

In my case, I can't open the door to my deck because it is blocked with snow, so I won't be shoveling it. My neighbor – the one with the artificial Christmas trees – built it and assures me that it is constructed to roof specifications. That means my 30 sq ft deck should safely withstand 1,500 pounds. Even my two feet of snow back there should only weigh about 600 pounds. Now I just have to live with looking at his plastic trees until I can use my deck again this spring.

Adam Wasch promotes energy awareness for the Cooperative Extension Service (CES) and the Cold Climate Housing Research Center (CCHRC). For questions or comments please contact CCHRC at (907) 457-3454