

Roof Collapse

The partial or total collapse of a roof due to the weight of snow or water is a serious concern and presents significant property and life safety dangers.

Wet snow is more dense than “dry” snow, and presents a greater collapse hazard. Snow typically takes on 50 percent of its weight in rainwater; therefore, a foot of snow, which normally weighs about 14 lbs. per cubic foot could weigh about 21 lbs. per cubic foot.

The primary cause of roof collapse is due to accumulation of snow or water causing overloading on the roof surface, which exceeds the structural support capabilities.

Most snow or rain loading collapses occur on flat roofs with slopes of 1 percent or less, on roofs of lightweight construction, or on roofs that were designed for minimum loads for their areas. As rainwater or snowmelt water flows to low areas, those areas can sag, allowing a deeper pond to form, which in turn collects more water. This is the “ponding cycle,” which has been responsible for most roof collapses due to rain loads or rain-and-snow loads.

Overloading and collapse is also caused by inadequate drains, clogged drainage devices, or backed-up roof drainage systems.

Prevention

The prevention of roof collapse due to the above conditions involves several steps that a building owner should take. Following are some suggested recommendations.

Before Winter

- Periodically inspect roof framework for obvious signs of weaknesses and damage.
- Have an architect or a structural engineer determine your building’s safe maximum snow depth.
- Roofs that do not meet guidelines for your area should be upgraded.
- Inspect and clean drains of debris, leaves and silt. Make sure exterior downspouts are clear of snow or ice at outlets.

During Winter

- Monitor snow depths on roofs.
- Verify drains are clear of ice and snow to allow winter run-off.
- Be particularly watchful of situations that involve snow drifting potential such as:
 - changes in roof elevations or heights.
 - winds over moderately- or low-sloped single-gable roofs.
 - valleys formed by multiple-gable roofs.
 - roofs with multiple projections (parapets, penthouses, etc.).
 - adjacent, unattached structures or nearby terrain features.

Keep in mind that regardless of the building configuration or design, there are several simple safeguards that can be helpful, but they must be initiated early to prevent serious losses.

