

## Snow Loading - Roofs

Snow on sidewalks and roadways can cause slips, falls and auto accidents. Heavy snow accumulations on roofs are just as problematic. Roof damage from heavy snow loads and ice dams are a major cause of property loss. Worse still, a sudden roof collapse can seriously injure or kill occupants of the building.

How much snow can a roof hold? If the building is relatively new, the snow load rating may be found on the building plans. If the building is older, a professional may have to be consulted. The fact that a roof has lasted through many snow storms does not guarantee that it will last through the next. Roofs of most older buildings were built with little or no insulation, so snow melted fairly quickly. If insulation has been added to the roof, snow and ice won't melt as rapidly and snow loads will accumulate to greater weight levels, further fatiguing an aging structure.

### Guide for Discussion

#### Estimating snow loads

Unfortunately, there is no easy way to determine how heavy a snow load is. The density of snow varies greatly. Freshly fallen snow is much lighter than thawed and refrozen snow. Dry, newly fallen snow may weigh 7-10 pounds per cubic foot; thawed and refrozen snow may weigh up to 60 pounds per square foot. Rain water will add even more weight. Structural engineers recommend taking several cubic foot samples of snow and weighing them to calculate the weight of snow on a roof, rather than measuring the depth of the snow. Drifting snow, which may put excessive loads against equipment or penthouses or at walls between roof levels, will complicate calculations.

#### Signs of Danger

Fortunately, few roof failures occur without some warning signs, beware of:

- Severe roof leaks.
- Ripples or bends in steel roof supports. Also cracks in wooden members, rolled or bent metal purlins.
- Sagging ceilings or roof lines. Note: a suspended ceiling may hide these sags. Remove the tiles, and look above them.
- Cracks appearing in walls or ceiling. Again, a suspended ceiling may hide these cracks.
- Loud popping or cracking noises from the building structure. (A laminated wood beam in one school broke with such force that personnel reported hearing what sounded like a gun shot.)
- "Ponding" of water on the roof in areas where it never accumulated before.
- Obvious deformities in the roof.

*Remember, look for these warning signs during the annual structural inspection as well as during cold, snowy weather.*

If a snow load is too heavy for the roof, the only solution is to remove it as quickly as possible. Snow removal plans are commonplace for roads and parking lots; consider developing one for your facilities' roofs.

One way to remove snow from a roof is to physically get up on top of the roof and push the snow off with a shovel and/or broom. This approach, obviously, poses **serious safety** concerns. It's important to use ladders, safety ropes and take all necessary precautions. Snow rakes also can be used to remove snow.

When working from the ground using a snow rake, **use extreme caution** when working near overhead electrical power lines. Also, avoid excessive scraping on the roof or trying to chip off ice. This can damage the roof.

*Continued*

## Snow Loading - Roofs, Continued

### Roof Snow Removal

- Remove snow and ice from drains or drainage devices first.
- Remove drifted and unbalanced snow loads first.
- Remove snow in strip patterns, starting at the drainage device and proceeding up the slope. Remove snow in strips. The goal is to reduce the load: the snow and ice do not have to be completely removed.
- Take care when you remove snow at the base of walls.
- Use plastic shovels and plastic tubs for lowering the snow to the ground.
- Protect and barricade areas where snow will be dumped or lowered.
- Don't use snow blowers.
- Don't pile snow on the roof.
- Don't use picks, hammers, spud bars or other sharp tools to remove ice.
- Don't use hot water pressure washers to remove snow from the field of the roof. This water generally freezes before it drains from the roof, adding to the weight.
- Don't block exit doors or fire exits with snow dumping or stockpiling.

### Additional Discussion Notes:

#### Remember:

Attendees \_\_\_\_\_