



AMERICAN BUILDINGS COMPANY

A NUCOR COMPANY

December 2, 2019

Sent Via email

Subject: Potential Roof Snow Overload Condition

Dear ABC Builder:

Winter is almost here and in much of North America winter brings with it the potential for roof snow overloading conditions on many buildings and structures. For your reference, we have attached a copy of the recommended [MBMA Snow Removal Guidelines](#) as well as the [ABC](#) and [AMS](#) Guidelines. Please carefully review this information and share it with your customers and other metal building owners.

In the unfortunate event that a structure has experienced damage, please take immediate steps to ensure the safety of those in and around the building. We recommend that a local consulting engineer be involved in the process to assist with safe and practical solutions to secure the structure and minimize further damage. American Buildings Company is a metal building manufacturer and does not act as the Engineer of Record for the original construction of a project or for the repairs of a damaged structure or as Consulting Engineers for distressed buildings.

If the need arises, American Buildings Company will support you in the sale and supply of replacement materials to assist the Owner with any repairs or reconstruction of the metal building. Please contact one of our Technical Service Centers to execute a contract to purchase materials with proper design specification and code compliance as determined by a licensed engineer involved in the investigation.

Thank you for your attention to this issue and please do not hesitate to contact me or one of our Customer Service Supervisors if you have any questions. You will be directed to one of our Engineering Supervisors who stand ready to assist you in any way that American Buildings Company is able.

Sincerely,

Greg Kuebrich – South Division
Corey Norris, P.E. – Atlantic Division
Devin Webster, P.E. – Midwest Division
Wayne Adler, P.E. – West Division
Builder Services Managers



Snow Removal Guidelines

Roof snow accumulations in excess of specified project design loading criteria can cause significant distress to your building structural system. Snow will build up in areas around firewalls, parapet walls, valleys, dormers, and on lower roof levels where a roof step occurs. Since the density of snow varies depending on weather conditions during and after a snow fall, it is not possible to determine a single value for the allowable height of snow that a building can safely support.

In addition, the underlying snow density increases due to melting from the building heat loss and as water is absorbed from the melting snow above. As weather and temperature changes continue, ice may build up under the snow layers, further increasing the building roof loading intensity. This ice build up also causes additional water back-up on the roof deck.

The most severe condition occurs when rain falls on a roof system already loaded by snow. In this case, the snow absorbs the rain water, and loads can approach the weight of water (62.4 pounds per cubic foot, or 5.2 pounds per inch of depth). This condition must be monitored with extreme caution.

The following procedure may be used as a guideline for responding to roof overload conditions due to extreme snow and ice build up conditions:

Snow Removal:

1. Visually inspect the roof system to identify unusual deflections of frames, purlins, or joists. Starting in this area, remove approximately one-half of the snow depth in a pattern that does not cause an unbalanced loading condition on the frames or purlins.
2. In general, the shoveling pattern should progress from each endwall of the building towards the center. On larger roof areas, additional people working from the center of the building to the ends is recommended.
3. Along the building width, remove snow from the eave towards the ridge. On buildings with a ridge, remove the snow on both sides of the ridge at the same time.
4. Remove the remaining excessive snow depth in the same manner as described above.
5. Never use metal shovels or “scrape” the roof down to the surface of the panel. Remember, the objective is to relieve the excess loading condition due to the weight of the snow, not to completely clear the roof panel of all snow and ice. Attempting to scrape the roof will result in broken fasteners, creating roof leaks, damaged panels and/or damaged trim.
6. Keep gutters, downspouts and roof drains open and free flowing to prevent water back up and ice build up on the roof system. Ice damming conditions are especially likely on the north side of a building and in shaded areas. Installing heat tape in gutters and downspouts can also be used as a precaution, however, heat tapes may not be 100% effective in extremely low temperatures and should be checked regularly.
7. Watch for extreme deflections and listen for unusual noises as indications of excessive snow and/or ice.

Safety Guidelines:

1. Always provide proper safety precautions when working on the roof.
2. Pay special attention to and be aware of Translucent Roof Panel locations. These panels are not intended to support roof foot traffic loads.
3. Be cautious of snow or ice breaking away and sliding down the roof, even on low slope buildings. Metal roof systems are extremely slippery when wet. It may be necessary to locate ladders at the end of the building to avoid sliding snow.
4. Use extreme care when working along the edge of the roof.
5. Never send one person alone on a roof to remove snow.
6. Take precautions to avoid damage to walls, etc., due to falling snow/ice sheets during removal from the roof.

ABC does not make any recommendation on when to remove snow from roofs. It is up to the individual property owner to consider the benefits and dangers of snow removal and decide their own course of action. Remember to consider the depth and relative moisture content of your snow and the capacity of your roof structure in making your decision to remove snow or not.

It is also recommended to review the “Snow Removal” section of the MBMA Metal Building Systems Manual, current version.

Also refer to the ICBEST – 2001 article ‘Minimizing The Adverse Effects of Snow and Ice on Roofs’. <http://www.poa.usace.army.mil/Portals/34/docs/engineering/MP-01-5663,%20Minimizing%20the%20Adverse%20Effects%20of%20Snow%20and%20Ice%20on%20Roofs.pdf>



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In addition, the underlying snow density increases due to melting from the building heat loss and as water is absorbed from the melting snow above. As weather and temperature changes continue, ice may build up under the snow layers, further increasing the building roof loading intensity. This ice build up also causes additional water back-up on the roof deck.

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2. Pay special attention to and be aware of Translucent Roof Panel locations. These panels are not intended to support roof foot traffic loads.
3. Be cautious of snow or ice breaking away and sliding down the roof, even on low slope buildings. Metal roof systems are extremely slippery when wet. It may be necessary to locate ladders at the end of the building to avoid sliding snow.
4. Use extreme care when working along the edge of the roof.
5. Never send one person alone on a roof to remove snow.
6. Take precautions to avoid damage to walls, etc., due to falling snow/ice sheets during removal from the roof.

AMS does not make any recommendation on when to remove snow from roofs. It is up to the individual property owner to consider the benefits and dangers of snow removal and decide their own course of action. Remember to consider the depth and relative moisture content of your snow and the capacity of your roof structure in making your decision to remove snow or not.

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A9 Snow Removal

A9.1 Introduction

One of the most detrimental climatological conditions to metal buildings is snow and ice buildup on the roof. Snow buildup to any significant depth greatly increases loads on the roof. While much of the snow will tend to slide off steeper roofs, (over 4:12 slope), much will remain that falls on a cold surface or previously covered surface. It is common to prevent snow slide by having devices placed on the roof in strategic locations. Snow will tend to slide more readily on a warm roof, caused either from sunshine or heat loss through the roof. Relatively little snow will slide off low slope roofs.

A9.2 Drainage

Gutters, downspouts and interior roof drains allow for the controlled removal of water from a roof system. They must be kept open and free flowing to work. During cold temperature conditions, gutters, downspouts and drains can freeze solid allowing for ice build-up on the roof. This ice build-up causes additional water back-up on the roof deck. These circumstances create extreme loading conditions on the roof system and building. Freezing conditions are particularly likely on the north side of a building and in shaded areas of a building.

One simple precaution is to have heat tape installed in gutters and downspouts. This will help maintain open and flowing gutters and downspouts. However, in extremely low temperature conditions, heat tapes may not be 100% effective and should be checked regularly.

A9.3 When to Remove Snow

Defining a specific depth of snow that a building has been designed to support is not possible because the density of snow is variable and dependent upon weather conditions both during and after a snowfall, as well as affected by the total depth of snow at a location. With the variability of snow density, it is possible for conditions to exist that exceed the designs specified by the building codes. Snow density also changes as the snow melts. Not all water drains off the roof as the underlying snow absorbs some water from the melted snow above. This leads to ice build-up on the roof as the temperature varies from day to night.

Fresh snowfall may weigh as little as 10 to 12 pounds per cubic foot (pcf) but the density will greatly increase as it compacts and becomes heavier with water. Typical densities on a roof will range from 16 pcf to 30 pcf depending on snow depth. When there is snow on the roof of a building and rainy conditions occur, excessive loads can develop rapidly. Snow acts as a sponge in these conditions and loads can approach the weight of water, 62.4 pcf or 5.2 pounds per square foot (psf) per inch of depth. Rarely will a cubic foot of snow and ice equal the weight of water due to the expansion that takes place as water freezes. However, these conditions must be monitored with extreme caution.

Snow will build up in areas around firewalls, parapet walls, valleys, dormers and on lower roof levels where a step in the roof occurs. All modern building codes require design for snow build-up conditions so that the structural systems in these areas can support the additional loads. However, due to the variability of snow density, as noted above, it is possible for conditions to exist that exceed the designs specified by the building codes.

While it is not possible to accurately determine a specific depth of snow that is considered a safe maximum, an approximation can be made. The first step is for the building owner to obtain information as to the snow load the building has been designed to carry. For example, a building designed for a 30 psf snow load can be at design load with just 18 inches of snow at a density of 20 pcf and could be overloaded with less than a foot of snow under wet conditions. Clearing snow from the roof is, of course, the only way to relieve this. It is recommended by Factory Mutual (Ref. B2.44) that roofs be cleared of snow when half of the safe maximum snow depth is reached. The maximum snow depth can be estimated based on the design snow load and the density of the snow and/or ice buildup.

A9.4 Snow/Ice Removal Procedure

Following are some suggestions that generally apply, however, it is recommended that the building manufacturer or a structural engineer be consulted before snow removal is initiated.

- 1) Remove all hanging icicles from eaves and gutters. These will be quite heavy and if snow hangs up on them during removal, it can only increase this load. Care must be exercised to not damage the building and to not endanger pedestrians.
- 2) Always provide proper safety precautions when working on the roof. If possible, remove snow without getting up on the roof. Using draglines through the snow, working from the endwalls, can sometimes accomplish this.
- 3) Place ladders at the end of the building so sliding snow will not dislodge them.
- 4) Never send just one person on a roof to remove snow.
- 5) Remove snow in a pattern that does not cause an unbalanced loading condition. Avoid large differences in snow depth between adjacent areas of the roof. Do not remove all of the snow from small areas and then move on to another area. Instead, remove the snow in layers from all over the roof. This gradually decreases the load.

- 6) Remove drifted areas first, down to a level with other snow. If an area has drifts four feet deep and the main roof is two feet deep, trim off the drifts to two feet before proceeding.
- 7) Remove snow from the eave towards the ridge, sliding the snow off the roof over the gutter.
- 8) Remove the snow from the middle one-third of each bay for the full width of the building, beginning with the most snow packed bay. Complete snow removal on the remainder of the building.
- 9) On gable buildings, remove snow on both sides of the ridge at the same time.
- 10) Never use metal shovels on any type of roof. Do not use picks, axes or other sharp tools to break up ice on the roof. It is quite easy to damage roofing materials with these tools.
- 11) Do not remove snow to less than a 3" depth over roof sheets. Care must be taken to eliminate hitting panel fasteners, snow guards, etc. If an ice layer is next to a panel, it should be left, if not extraordinarily thick.
- 12) Care must be taken in removal of ice and snow around ventilator bases, pipe flashings, and HVAC units, due to the ease of damaging neoprene boots, pipes, conduits, etc.
- 13) Be cautious of snow or ice breaking away and sliding down the roof, even on low slope roof buildings.
- 14) Use extreme care when working along the edge of the roof.
- 15) Watch for extreme deflections and listen for unusual noises when snow and ice build-up conditions exist.



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Shop Primer

According to SSPC (Society of Protective Coatings), shop coat primers are intended for protection for only a short period of exposure in ordinary atmospheric conditions, and are considered a temporary and provisional coating. These primers are designed only to protect the steel from flash rusting during transportation, not protection from long-term exterior exposure on a jobsite or as part of a coating system. The severity of exposure to weather can vary over short distances, sometimes dramatically, due to factors such as, wind, salt spray, condensation, fumes, and the use of de-icing chemicals.

The shop applied primer may require field/touch up repair as a result of, but not limited to, the following conditions:

- 1) Abrasions from: Bundling, banding, loading and unloading, chains, dunnage and handling during the erection process:

NOTE: Rust should be expected at any abrasions.

- 2) Dirt.
- 3) Diesel smoke.
- 4) Road Salt or Jobsite Salt.
- 5) Weather conditions during field storage.

ABC shall not be responsible for the condition of the primer if it is not properly protected after delivery (or stored outside due to delayed deliveries). Material should be kept clear of the ground and positioned to minimize water ponding. ABC recommends following the guidelines in the “General Erection Guide” for unloading, staging, and jobsite storage of shop primed materials to minimize the need for touching up the primed parts. Please note that the Manufacturer is not responsible for repairs of damage to primed surfaces due to improper field storage or site/transit conditions.

You can be assured that American Buildings is striving to ensure you receive a quality product the first time!