

Hail Damage to Metal Buildings

Introduction

Hail causes dents on metal. Some dents are tolerable; some are not. It costs money to replace things. If the dents are not bothering anyone, why should the material be replaced.

For this reason, some insurance companies have incorporated "cosmetic" language when it comes to classifying dents on metal surfaces.

This document attempts to explain some of the thinking behind this distinction.

1. Damage

The public understands what is considered to be damaged. The criterion for hail damage is based on this understanding. According to the Webster Dictionary, damage is defined as follows:

physical harm caused to something in such a way as to impair (lessen, weaken, reduce, diminish) its value, usefulness, or normal function.

2. Hail Impact Damage - General Discussion

When a specific item is damaged by hail there are usually four things that are always present that support the correct conclusion that hail was the impacting object. They are as follows:

1. Historical Weather History. In today's world of abundant information, there is usually ample supportive historical weather data to conclude the likelihood of hail in a certain area at a certain time. The NWS is a good source, but there are others.
2. Collateral Evidence of Hail. If one item is damaged, there are usually other items that are damaged or show evidence of hail. Collateral evidence or the lack of collateral evidence is extremely important when evaluating a hail claim. Collateral evidence will give on the size and direction of hail.
3. Eyewitness Testimony. Normally, people are eager to describe a storm event.
4. Impact damage consistent with damage as seen on other properties when hail was determined to be the cause of damage. Certain items damage similarly from hail from place to place.

3. Cosmetic Hail Damage to Metal Surfaces

Hail damage to metal surfaces can be defined as functional or cosmetic damage. Either damage is in the form of identifiable dents that are caused by hail.

Cosmetic damage to a metal surface is normally understood to be permanent noticeable dents that are visible by a casual observer without extraordinary means that do not alter the function of the exterior system.

Dents that are not easily observable on the surface or need to be chalked to be seen would not be considered cosmetic damage. It must affect the aesthetic characteristic of the surface to be considered cosmetic damage.

4. Functional Damage to the Coating of Metal Panels

Suspected hail damage to the coatings on metal roof panels has proven to not be an issue with modern coated metal surfaces. The coatings that are used on metal panels have been significantly improved with advancements in technology. Panels are coated then formed into desired profiles by bending machines.

The bend radius of typical panel profiles normally far exceeds bending created by hail; therefore, the bending at a hail dent causes no more stress on the coating than at a formed bend. Time has shown that modern paint applications are not typically damaged by hail.

5. Functional Hail Damage to Metal Surfaces

The primary function of metal surfaces on the exterior of a structure is to protect the interior from the outside weather, including precipitation. Therefore, an opening that is created by hail that enables water to intrude behind or beneath the surface would most often be considered functional damage to a metal system. However, open air structures may not be held to this standard if the primary function of the roof is shading people or shading machinery from the sun. The building's function must be evaluated.

Potential openings in the exterior system must be individually evaluated when inspecting an exterior surface that has been exposed to hail. Fastener location and panel edge conditions must be evaluated.

6. Functional Damage to a Fastener Location

Hail damage to a fastener must not be confused with normal age-related leak problems with exterior fasteners.

Exposed fasteners have a limited age of remaining weather tight. Metal buildings are notorious for leaking at fastener locations. The nails or screw must be installed correctly to compress the washers. Washers will crack and give out with age. Eventually, metal buildings will leak due to fastener failure. Owners will coat the fasteners hoping to stop the leaks. Others will replace the fasteners. Both have proven to be viable solutions.



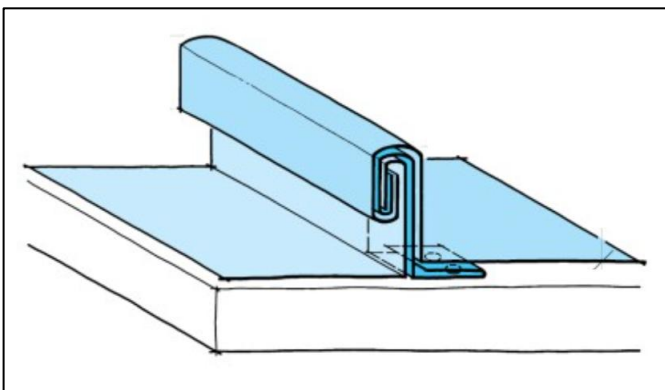
Hail will also impact a fastener and cause a deformation that creates an opening. Small hail does not cause this type of damage. Large hail that deforms the panel and the fastener are more likely to develop leaks. This is a known mode of failure.

7. The Standing Seam Roof

The side lapped connection of metal panels usually creates a tight joint that makes it difficult for wind driven rain to penetrate. Hail can disturb this joint.

Not all side-laps are the same. Some side-laps are much better than others. Some side-laps contain a sealant. Most do not contain sealants. Some are simply overlapped while others are mechanically bent together.

Typical standing seam side lap joints are very resistant to moisture penetration when slightly deformed from hail because the lapped joint is mechanically bent together and contains a sealant.

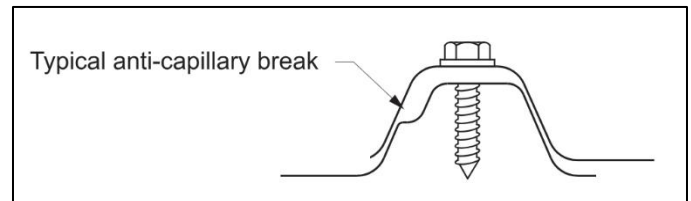


8. The Simple Over Lapped Panels

Panel side-lap and end-lap suction related leaks have been identified in the past and have been addressed with sealants and capillary breaks.

When two pieces of metal are placed tightly together, water can wick between the two surfaces. Flexing of the panels or slight changes in internal and external pressures can cause a roof to leak.

Researchers have discovered that creating air gaps in overlapping materials will break the siphoning effect. Panel manufacturers have therefore created anti-siphoning lapping systems to prevent the wicking that leads to interior leaks. The image below shows an overlapped side-lapped connection that has an air gap which prevents water from wicking over the lapped edge.



If the deformations from hail are too large on a lapped seam, wind driven rain can easily find its way up and over the air gap causing wicking and subsequent interior leaking. For this reason, hail impact to lapped seams that have significantly opened the seam are considered functional damage as the ability to prevent interior leaking has been diminished.

9. Dent Classification Summary

In summary, dents on a metal surface can be classified in order of severity in the following manner.

1. Dents that are present but are not caused by hail.
2. Dents from hail that are less than Cosmetic Damage. Dents that are caused by hail but are too small to be noticed by anyone without a flashlight or chalk, or extraordinary means. The dents would not be perceptible to a casual observer.
3. Cosmetic Damage - Dents caused by hail that are noticeable to a casual observer but have not changed the functionality of the material. It has only changed the appearance.
4. Functional Damage - Dents caused by hail that have changed the functionality of the material.

By Richard T. Abbott, PE
Abbott Consulting Forensics and Design
www.abbottforensics.com