

# WHAT THE HAIL?

By Joseph Jenkins

**H**ailstones usually consist of water ice measuring between 1/4 and 2 inches in diameter (the size of a small pea to the size of a golfball), with larger stones coming from severe thunderstorms. Hail forms on dust, insects, or ice crystals when supercooled water freezes on contact. Once a hailstone becomes too heavy to be supported by a storm's updraft, it falls out of the cloud. When a hailstone is cut in half, a series of concentric rings reveals the number of times the hailstone had traveled to the top of the storm before falling.

Hail can sometimes grow to 6 inches and weigh more than half a pound. It can do serious damage to cars, skylights, and crops. Massive hailstones have caused concussions and fatal head trauma. The last known hail fatality in the United States was Juan Oseguera, a 19-year-old who died after being hit in the head by a softball-sized hailstone in Lake Worth, Texas, on March 29, 1990. Hail-producing clouds may be green in color.

Hail damage to a slate roof is easily identifiable. Although slate tends to be durable and resistant to hail, there are three primary conditions that will maximize damage to such a roof: 1) very large hail; 2) thin, soft, or deteriorated slates that are relatively fragile (such as older Pennsylvania soft black slates); and 3) slates installed in a side-lap style where much of the roof has only a single layer of slate. The combination of unusually large hail and unusually fragile slates, especially on a side-lap slate roof, creates the highest expectation of slate roof damage.

Hail is frozen water propelled through the air by the force of wind and gravity, and it can damage a slate roof upon impact. The effect of that impact is to either break or puncture the slates and/or dent metal flashings. In general, slate can be perforated by objects from either inside or outside a roof. Two common examples of impact damage from inside a roof include bullets shot through a roof from the interior of the building, often seen on barn roofs where farmers shoot at pigeons in the rafters; and nail heads in the roof deck working loose and slowly pushing through the slate above. External impacts include hail, rocks, golf balls, bullets shot from outside, etc. Thought different, both types of perforations are easily identifiable. When slate is perforated, the impact leaves a clean hole on the impact side and a cratered hole on the opposite side of the impact (*Figure 1*). Therefore, by looking at the hole, one can easily determine whether the impact originated from outside or inside.

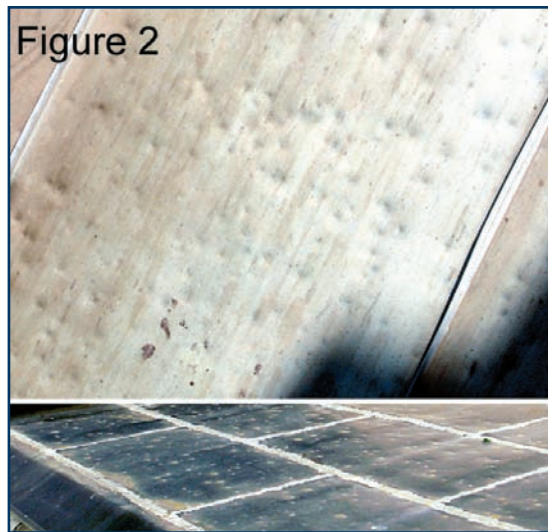
Another way to assess the amount of hail impact on a roof is to examine the metal components for indentations. For example, *Figure 2* illustrates hail impact indentations on low-slope copper roofs after severe hail events. These roofs are in New Orleans and Chicago. *Figure 3* illustrates hail damage to a graduated slate roof in Indianapolis. Although the slates were 1/2 in to 3/4 in thick Vermont slates only 75 years old, some were perforated by huge hailstones.



*Figure 1 - When slate is perforated, the impact leaves a clean hole on the impact side and a cratered hole on the opposite side of the impact. (All photos by Joseph Jenkins.)*

Although hail can damage a slate roof, in most cases the roof can be repaired. This author examined at a 100-year-old Vermont sea-green side-lap barn roof after a severe hailstorm and, looking up from inside, it resembled a planetarium – points of light were everywhere. But a day's work for a couple of experienced slaters replaced all of the perforated slates.

The larger problem with hail events is that roofing contractors with little experience working on slate roofs and who see money to be made on an insurance claim will condemn a roof that has been hail damaged rather than propose to repair it. Many good slate roofs have been lost because of this. Part of the fault lies with insurance companies who are quick to fork out money to have a slate roof replaced before getting an expert opinion on the roof's actual condition. It's possible that soft slate on an old roof that has been impacted by large hail could be fatally damaged, but in most cases, hail damage on a slate roof should simply be repaired.



*Figure 2 – Hail impact indentations on metal roofing are not typically a cause of leaks and can often simply be ignored.*




*Figure 3 – Hail-perforated slates should simply be removed and replaced. Hail damage rarely justifies replacement of an entire slate roof.*



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Such repair involves the replacement of damaged slates, which can be either perforated or broken. In some cases, damaged flashings may also have to be replaced. When replacing damaged slates, the replacement slates should be of the same size (length, width, and thickness), type (i.e., origin, such as Vermont sea-green), shape (e.g., square-cornered, beveled, scalloped), and approximate age, since new slate (with few exceptions) rarely blends in well on an old roof. 

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### Joseph Jenkins

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