

# HAIL DAMAGE TO ROOF SHINGLES

By

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Hail forms when frozen water drops are lifted in turbulent wind regimes during thunderstorms. The frozen drops of water increase in size and eventually fall to earth as hail having been driven by a combination of gravity and wind forces. Hail stones vary in size from pea size (1/4 inch diameter, little roof damage), through marble size (3/4 inch in diameter, threshold damage to roof materials) to golf ball size (1 1/2 inch in diameter, typically severe damage to roofing materials). Hail size distributions tend to be localized with some roofs damaged, while others are not. Wind direction plays an important role, as well as roof pitch. A direct impact of hail on a shingle is more damaging than that of a glancing blow. Figure 1a illustrates the dynamics of

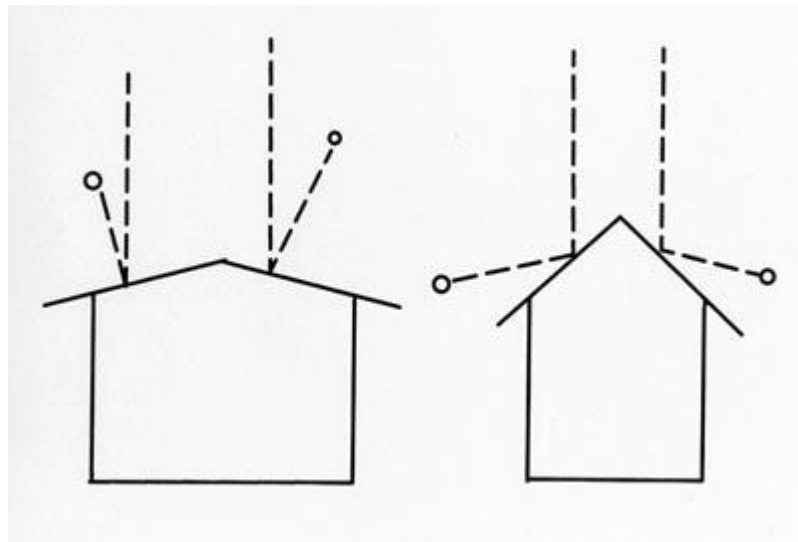


Figure 1a

hail impact on two different roof pitches. The home on the left would sustain more roof damage than that on the right, because of the more direct impact on the left as opposed to the less damaging, glancing, blow to the right. Wind conditions can distort damage to a home as illustrated in Figure 1b. The home on the left has more glancing blows to the roof from the

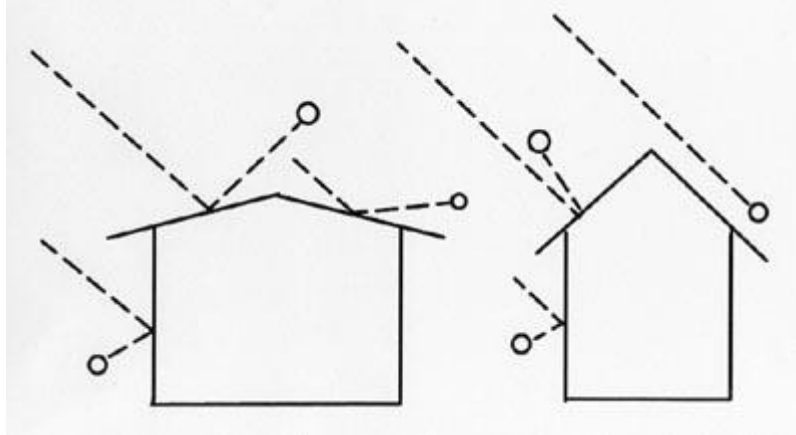


Figure 1b

wind, while the windward wall comes under attack from direct hail impact. The right wall is protected and undamaged from the hail. The home on the right will more likely sustain roof damage on the windward side because of the more direct impact. Assessing hail damage is often accomplished by a roof inspection, which usually occurs several days to several months after the hail event. Determination of whether hail actually fell at a site can be made through statements and weather reports. Inspection of thin, aluminum fixtures helps verify hail impact. Figure 2a shows denting on a roof vent cap indicating that hail had struck the vent at one time.



Figure 2a



Figure 2b

Figure 2b shows denting on a flue vent indicative of hail impact at one time. The denting on these two fixtures does not impede their function.



Figure 2c

Figure 2c shows deformation to condensing unit fins on an air conditioning system, as a result of a driving hailstorm. This damage does impair operation of the unit, in that air flow through the coils is reduced, causing higher refrigerant temperature, lost performance and lost reliability.

Figure 3 shows shredded and pock-marked paint from a driving hailstorm. The base wood was undamaged but repainting was required.



Figure 3



Figure 4

Figure 4 shows mild impact marks on a cedar shingle, consistent with hail impact. These marks will typically dissipate over time with virtually no effect on shingle life. Figure 5 shows more severe shredding from hail impact. If the impact marks are causing severe splits, then shingle life will most likely be adversely affected.



Figure 5

Figure 6 shows impact damage to siding as a result of wind driven hail. Some shredding and minor splitting has occurred but the siding appears structurally sound.



Figure 6





Figure 7

Hail damage to asphalt shingles includes severe granule loss, material removal at the edges of the shingles and penetration. Figure 7 shows grit loss from asphalt after pounding from a hailstorm. New asphalt shingles are more resistant to hail impact than older shingles since the asphalt becomes more brittle with age. Warmer shingles are more compliant and more resistant to fracture from hail when compared with colder shingles. Shingles rely on a structurally sound substrate for hail damage resistance. Flexible roof sheathing allows the shingles to flex during impact causing damage, while more rigid roof sheathing supports the shingle during impact resulting in less shingle damage.

In recent years, roof shingle manufacturers have been listing products that conform to Underwriters Laboratories test standard UL 2218, which classifies the resistance of a particular product to hail damage. The test entails dropping steel balls on samples and observing the damage. A Class 4 rating is the most resistive to hail damage, while the Class 1 rating is the least resistive. Some insurance companies are reducing premiums when Class 4 shingles are used. The roofing industry takes issue with some of the testing methods, indicating that shingle aging and thermal environments are not taken into account.

Most hail related damage is cosmetic and does not affect the useful life of roof shingles. In other cases severe wood splitting, significant granule loss, penetration of the shingle and fracture may require shingle replacement.

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