

# When It's Not Hail

By David P. Amori, PE, RRC

Every spring and throughout the summer, much of the U.S. is subjected to thunderstorms that produce damaging hail. Property damage can manifest in several forms: broken windows, damaged roof top equipment, and roof damage. With a residential roof replacement starting at several thousand dollars and a commercial roof at tens of thousands, functional roof damage is probably the largest expense exposure for most buildings.

When a roof is no longer performing its intended function, the mechanism that brought it to that condition must be determined for the purposes of identifying coverage. What is the intended function of a roof? The main and most obvious one is to keep weather-related elements out of the building. There also are energy-related,

service life, and structural aspects to a roof. When one of these functions is affected, the cause of that damage must be determined. This could include storm-related damage, maintenance issues, construction or manufacturing-related defects, and mechanical damage. Mechanical damage can be broken into two subcategories: intentional and unintentional.

Hail is a chunk of ice falling out of the sky at its terminal velocity. The size of the ice depends on the number of times it goes through a cycle of getting wet (lower altitudes) and freezing (higher altitudes). The terminal velocity is dependent on the size and weight of the hail stone as well as wind direction and barometric pressure. Hail comes in all shapes and sizes and also comes in varying densities and hardness. So

a hard, two-inch diameter stone could inflict as much damage as a slushy 2.5-inch diameter stone. Typically when a hail stone strikes a roof system, it either explodes or bounces off. Depending on the energy associated with the impact, hail can result in a puncture, tear, bruise, displacement of granules, or simply a cleaning of the grime or algae on the roof surface (spatter mark).

When hail strikes a property, it indiscriminately hits whatever is in its path. Hail can fall straight down or can be directional if pushed by wind. In either case, it will not decide to hit the roof but avoid the fence, air conditioning equipment, satellite equipment, or the SUV parked out front (unless, of course, they are shaded by slopes of the roof or the building due to the directionality of the hail). Armed



with this preliminary information, an engineer can start to devise a layered approach to an investigation to determine if the functional damage noted on the roof system is storm-related or from some other mechanism. The layers of this qualitative approach include the following.

**Distribution** – Hail damage would be expected to be random in size and distributed throughout the property (be mindful that it can have a directional component to it due to wind). On a sloped roof, hail can damage all slopes or just the windward slopes. An indication that the damage is not hail-related would be when damage is noted on some (but not all) windward slopes and some leeward slopes. Otherwise, hail related damage would be random in nature causing damage not only to the roof system, but also other exposed elements.

**Corroborating Evidence** – Other damaged components of the property that corroborate the existence of a storm should be qualified and documented. These components include satellite TV antennae, automobiles, vents, flue caps, windows, fences, and vegetation. These observations not only indicate whether a damaging storm was in the vicinity of the subject property, but also help identify when the storm hit. For example, if one of multiple roof-top units has been recently replaced and it's the only one undamaged, then the event must have predated the installation of the equipment.

**Physical Evidence** – The hail impact on a roofing system will be indicative of an impact. This is expected to be in the form of bruising, punctures, dents, or displacement of surface materials. Where the hail is not large enough to damage the system but cleans the grime or algae from the surface, this would be considered cosmetic evidence of the existence of hail but not functional damage. Weather data indicating the existence, location, and severity of the storm also falls under this category.

**When It's Not Hail** – It's not hail-related damage when one or more the aforementioned layers of the investi-

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gation are not present at the subject property. Some examples include damage consistent with what would be expected with hail on the shingles but the vents, TV equipment, air-conditioning equipment, windows, window screens, and vegetation all are devoid of evidence of being exposed to a storm. Physical damage to the roofing system is not consistent with impact from hail but rather of dropped tools, foot falls, knife marks (installation), or blisters (crater shaped and usually too small to be hail-related). Further examples include a distribution of damage that is not consistent with a naturally occurring event and damage that is concentrated at ridges and valleys where it is easier to walk or other unusual patterns, such as in groups or along lines.

The determination of the whether observed roof-related damage is or is not the result of a hail storm is the result of a qualitative approach to the inspection. Functional damage as the result of naturally occurring hail would be expected to meet all the criteria detailed herein with respect to distribution, corroborating evidence, and physical evidence. When these layers of evidence do not align, then the investigator focuses on other potential causes of the distress.

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