TL-0001 — Insulation and Ventilation to Limit Ice Dam Formation Technical Letter

Design of roof structures should incorporate building materials to limit the formation of ice dams and use materials that help prevent leakage caused by ice dams. GCP's self-adhered underlayments (GRACE ICE & WATER SHIELD®, GRACE ICE & WATER SHIELD®HT, GRACE ULTRA™, GRACE SELECT™, GCP granular underlayment, and Roof Detail Membrane™) provide protection to roof structures from leaks caused by ice dams but do not prevent ice dams from forming. Ice dams can cause devastating results if the standing water behind the dam gets underneath the roof coverings and into the attic and walls. The damage can be severe, as well as difficult and expensive to repair. In addition to water leakage, ice dams can severely damage roof coverings and other roof components.

Roofs designed with proper insulation and ventilation will help limit the formation of ice dams by minimizing the heat transfer from the building interior to the air in the attic space and removing any warmed air efficiently. The combination of insulation and ventilation is critical since ice dams can form even in buildings that are well insulated. Even small amounts of warmed air in the attic space may cause snow on the roof to melt. The water flows down the slope of the roof toward the eave where it re-freezes, since the eave overhangs unheated space. As the process continues, ice builds up at the eave forming a dam. Standing water becomes trapped behind the ice dam, usually right over the interior wall.

In a properly ventilated attic space, ventilation occurs when air in the attic space is warmed from heat that escapes from the building through the attic insulation.Warmed air rises toward the ridge vent where it can escape to the outside. Cold air is pulled into the attic space through the soffit vents, replacing the air that leaves through the ridge vent. The flow of cold air, that moves upward toward the ridge along the underside of the roof deck, is called a convection current. The convection current helps keep the roof deck cool and slows the melting process on the roof surface.

Proper roof ventilation and insulation design should be left to a qualified design professional and care should be taken to comply with local building codes. However, standard roofing practice is to use 1 ft^2 (0.093 m^2) of net free ventilation area per 150 ft^2 (14 m^2) of attic space, split evenly between the ridge and soffit vents. Soffit, ridge, gable, or roof deck vents may be used alone or in combination depending on the specific roof design. Soffit and ridge vents used together provide the most complete ventilation and is the preferred ventilation configuration. Gable vents are sometimes used but are not usually as effective as ridge vents.

It is easy to tell which buildings have well insulated and ventilated roofs. After a snowfall, if the snow is melted from only the top half of the roof, and an ice dam is forming, it is likely that the roof is poorly insulated or ventilated. If the snow does not melt, or melts evenly over the entire slope of the roof, the roof likely has adequate insulation and ventilation to limit ice dam formation.

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