The Prevention & Remediation of Ice Dams on Attics and Cathedral Slopes

The Procedures for Locating, Prioritizing, and Remediating the Causes of Ice Dams in Buildings
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House Crying for Help

Ice dams can be more than 2 ft thick.

Credit Robert Humbarger at ConSpecT Services, Inc.¹
Ice dams can continue up-slope from horizontal.

Credit Robert Humbarger at ConSpecT Services, Inc.¹
Ice Dam Detail

Root Causes

- Snow
- Exterior below freezing
- Roof deck above freezing

Credit Canadian Mortgage and Housing Corporations for Figure
Ice Damages

- Ice/snow sliding off of roof
  - Injury or death
  - Loss of property (cars or lower roofs)

- Melt water
  - Wet insulation, less efficient, more ice dams
  - Water damages building
  - Drains down to eave, freezes and causes ice dams.

- Weight of ice causes structural damage and can shear off edges of roofs and damage whatever it falls on.
Dam Control

- Keep roof deck below freezing when it’s freezing outside!
Old Methods of Dam Control

Images courtesy Building Science Corp. BSI-046: Dam Ice Dam
Doomed to be Dammed

Image courtesy of stockimages at FreeDigitalPhotos.net
Benchmark for Control - Ventilation

Figure courtesy of Building Science Corp. BSI-046: Dam Ice Dam
Keys to Ventilation

- Super air tight ceiling
- Add lots of insulation to top of ceiling
- Remove any heat that is allowed to enter attic through ventilation.

Image courtesy of iosphere at FreeDigitalPhotos.net
How We Blow Up Ventilation

- Cut Holes in the ceiling

Image courtesy of bobvila.com
How We Blow Up
Ventilation

- Install heating systems in the attic in cold climates
How We Blow Up Ventilation

- Not enough ventilation.
  - Every rafter, not every other or every third
  - Minimum 2” air gap between insulation and roof deck at eaves in “ice dam regions.”

Figure courtesy of Building Science Corp. BSI-046: Dam Ice Dam
Let's Fix the Dam

- Bring HVAC equipment and ducts inside
- Move the inside to create a conditioned attic
  1. Insulation on the top side of the roof deck
  2. ccSPF between the rafters
Conditioned Attics

Figure courtesy of Building Science Corp. BSI-046: Dam Ice Dam
Conditioned Attics

Figure courtesy of Highland & Company, Inc. ● PO Box 2317 ● Wilton, NY 12831
Are we done?

Image courtesy of David Castillo Dominici at FreeDigitalPhotos.net
Igloo Effect

Image courtesy of Ron Wassink at http://ronwassink.blogspot.com/
Over Roof Ventilation

“Where it Snows A Lot”

Figure courtesy of Building Science Corp. BSI-046: Dam Ice Dam
Building Science
Corpisms for Ice Dam Designs

- **Ice Dam Regions** – where ground snow load is 30 lb/ft².
  - 2” Gap versus 1” gap b/t insulation and roof deck for “Ice dam regions”.

- **Where is Snow A Lot** – where ground snow load is 50 lb/ft².
  - Vented over insulation needed for “where is snows a lot”
Overhangs

- Overhangs trap heated air generated from wall cladding (especially dark) and heat the underside of the overhang.
- Insulate the overhangs.

Image courtesy Building Science Corp. BSI-046: Dam Ice Dam
What about SPF?

- Vented attics
  - Great for retrofit and new construction
  - Air seals
  - Insulation levels across ceiling especially over top plate gets full R-value requirement.

- Conditioned attics
  - Caution when only installed between rafters.
  - Cover rafters
  - Watch out for thermal bridging.
Aspen, CO
Thermal Bridging

- Truss Joist I-beams or TGIs
Acknowledgements


- Tobiasson, W., J. Buska, A. Greatorex. Guidelines for ventilating attics and cathedral ceilings to avoid icings at their eaves. *Buildings VIII/ Roof Design-Practices*
Dam Discussion

Image courtesy of artur84 at FreeDigitalPhotos.net