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ZERO DRAFT



ROOFING SCIENCE

By John E. Bishop

John E. Bishop wrote this article from his position as a marketing professional with a non-profit organization that has been providing energy saving strategies and technologies to consumers and businesses nationwide since the early 1980's.

Winter weather plays havoc on roof systems in WNY. Even with adequate net-free area, moisture problems such as mold, mildew and ice dams persist. Often, the problems aren't with the roof or its venting, but what's going on below in the living areas.

Black Rock Roofing, (<http://www.blackrockroofing.com>) a Buffalo-based company founded in the 1940's, was concerned by the number of roof failures they began to see in recent years. New homes, employing better insulation and air barriers to keep energy costs down were resulting in tighter building shells. And these were killing their roofs. Moisture generated in the living areas was reaching the roof decking, causing disaster. Instead of passing the buck, Black Rock Roofing looked to the sciences for a solution.

Stack Effect

Stack effect is a naturally occurring condition found in homes, where colder outside air enters the home in a low spot, warms and exits at the top. The phenomenon is well-known and widely understood by the building science community, but only just becoming familiar in roofing circles. The physics are as follows:

- Warm air rises.
- The low areas of a home, which are slightly depressurized, draw outside air in (open a first floor window - the air draws in), while the highest areas (i.e. attic) are slightly pressurized, pushing the inside air out.
- As this air warms, and travels from the bottom of the house to the attic - like a chimney stack - it carries with it water vapor generated by occupants inside. And it doesn't make a clean exit through the vents; it more or less goes where it wants to (out the soffit, etc.), or it condenses into liquid water and stays in the attic.
- Attic ventilation offers little help to this common problem, and in some cases, makes it worse by increasing the home's stack effect.
- Ice dams may form as this air, which is heated by the home, melts the snow that rests on the roof. This melted snow then re-freezes as it runs down the roof, and forms destructive ice dams.





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The Solution: A Whole Building Approach

In 2002, **Black Rock Roofing** formed a strategic alliance with Canadian-based air barrier company **ZeroDraft**. Now called '**Black Rock Roofing & ZeroDraft of WNY**', the company also began rigorous technical training through New York's Home Performance with ENERGY STAR program.



Now, when Black Rock's crew shows up for a roof job, before they unload the ladders, the firm's principal, Michael Montaldi, begins testing the building with a blower-door device used in energy-efficiency audits to identify air leakage, and a manometer to measure air-pressure differences.

"Buildings act as one complete system, not a bunch of independent components," says Montaldi. "If you want to understand how a roof works, and want the ability to trouble-shoot problems like mold, moisture and ice dams, you need to know what's going on in the rest of the building structure."

Montaldi's company now addresses, not just the roof, but the whole house. He uses the manometer to gauge the connection between the attic and the conditioned areas below, while employing the blower-door device to identify specific points of air leakage between the two areas.

Common leakage points, or thermal bypasses as they are referred to by building shell analysts, include unsealed plumbing chases, lighting canisters, attic hatches and porous ceilings such as tongue-and-groove paneling. Unorthodox framing methods also can create (often hidden) bypasses that allow air and moisture to enter the attic.

Once these thermal bypasses are identified, Montaldi and company uses Zerodraft's two-component polyurethane foam products to seal any connections that would allow moisture to enter the attic from the rooms below. Blown-in cellulose, chosen for its strong air-sealing properties, is often added to improve the home's energy performance.

Quality Control

After Montaldi air seals the attic to control moisture migration, resulting in a far tighter house than when he started, great care is taken to ensure changes to the home's envelope haven't shifted the moisture problem to the living quarters of the home. He again employs his blower-door to measure the home's overall leakage rate and applies his numbers to a formula that determines whether the home is too tight or just right.

In the case of an overly tight home, which can result in condensation build-up on window, compromised air quality or mold, the company employs various mechanical ventilation strategies with the help of an HVAC technician. Montaldi says, "This is total quality assurance and everybody wins. The homeowner gets their problem solved once and for all, I've created satisfaction, and I can sleep better knowing I won't have a call-back."

Montaldi provides more than just a dry roof over his clients head. In addition to solving and preventing moisture-related roofing problems, projects that include air sealing and insulation measures often result in annual energy savings of up to \$600.00, as well as provide greater levels of comfort by reducing stack effect-related drafts. By expanding the technical expertise of his business, Montaldi raises the bar for competitors and has created an additional source of profits in the process.



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