

Mould, moisture and mildew in attics: Prevention and Cure Mean Healthier Homes, Energy Savings and New Business

The world of the roofer is changing quickly. Until the last year or so, the roofer was blamed for ice-damming and wet attic problems. The solution was to add attic ventilation, in many cases more than was required by building codes. Why? Because this was the roofer's only choice. To give the homeowner a full manufacturer's warranty, ventilation had to be installed to the local building code - one square foot of ventilation for every 300 square feet of insulated attic space, and twice that amount for low-slope roofs.

Unknowingly, the roofing industry was making the wet attic situation worse. How? They were following the correct procedure for ventilation, but only solving part of the problem. Ventilating a previously unventilated attic makes the attic colder. If nothing is done to stop warm moist air entering the attic space, condensation on the now cooler surfaces is a certainty. This will lead to mould and mildew growth. Eventually water and mould spores will find their way into the living space. Insulation contractors, suffering from the same lack of information about attics as roofers, have caused similar problems. Insulating the attic floor makes the attic colder in the same way as adding ventilation. However, if the insulation contractors do not seal and insulate, they will not stop the warm moist interior air from entering the attic and causing major problems.

The problem is continent wide across a variety of climate zones. It has been identified and verified by the Institute for Home and Building Safety in Boston, an insurance-funded group that investigates, advises and explains remedial and preventive measures for any potentially catastrophic loss. According to the Insurance Bureau of Canada, of \$50,000,000 worth of claims received by insurers in South west Ontario during a January 1999 storm, much of the property damage involved ice-damming and leakage. A recent roofing contractors' publication asked the question: "Who is responsible for snow or ice falling from the roof" (and injuries or killing innocent passers-by)? Until recently, insurers, like roofers, were unaware, of how insignificant ventilation was in solving the problem.

Canam's Zerodraft residential 'comfort contracting' division has been working with local roofing, insurance and home inspection communities to fix problems with wet attics. This article covers the latest developments in a story of how roofers and other interested parties are co-operating with home performance contractors for the first time on issues of liability, technical rethinking and customer service. It also describes repairs and preventive measures that are being carried out, and how a new business opportunity is being created in cold climate areas as a result.

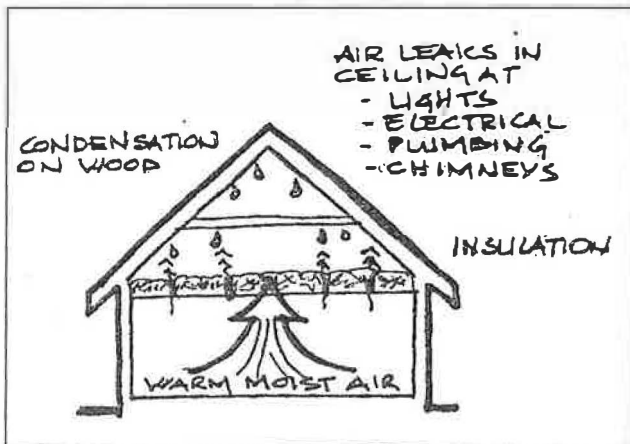
The publication last year by CMHC of Attic Venting, Moisture and Ice Dams is the strongest document yet to put attic ventilation in proper perspective. Ventilation is necessary for an attic to dry in Spring, but in too many cases ventilation cannot cope with the moisture load coming from the inside of the house. This load can be reduced by preventive measures. The number one priority in coping with attic moisture problems, including ice-damming and condensation, is to stop warm and moist air from the interior getting into the attic.

Mould and mildew spores are showing up far too often in too many homes, sometimes in houses less than two years old. Families with small children, elderly family members, or people with respiratory or allergy problems are at risk. Asthma levels in Canada have increased three-fold in the last twenty years, and have been blamed on the increase in mould. Health, comfort, structural durability, home asset value, and energy costs are all issues surrounding attic ventilation. By bringing in expert help to prevent occurrence, the roofer can provide better service, reduce callbacks and better protect the product warranty. It also means extra business for the home performance specialist, because roofers usually do not want their employees doing retrofit work in attics.

Causes and solutions

All these problems, both visible and invisible, are related. Ice-damming and attic condensation or 'wet attics', are symptoms of similar problem

*By Tony Woods, President, Canam Building Envelope Specials Inc. Mississauga, Ontario
www.canambuildingenvelope.com and
www.zerodraft.com*



botched renovations and a high humidity lifestyle, to a combination of all these.

The solution is to isolate the attic, making it a completely separate space from the rest of the house. To do this, ensure that warmth and warm air containing moisture in the living space cannot get into the non-conditioned space in the attic. Keep the attic sealed off from the living area below (using air leakage control measures to seal holes, cracks and gaps), then add insulation as appropriate to keep the attic cold.

One-step cure and prevention

As a consulting contractor, Zerodraft tends to arrive on the scene after the 'educated' roofer has discovered the problem. If rotting, mouldy or mildewed wood has been found, clean-up and possible replacement may have to be done before the 'comfort contractor' can start work. There are times when a roof removed before replacement is very convenient for doing the work, such as situations involving a low sloped roof, cathedral ceilings, kneewalls, access problems, or aesthetic considerations. After a blower door test and/or visual inspection have been completed, the remedial work can begin. The checklist in figure 3, Where and how to seal attic leaks, shows how to make sure the usual potential leaks are covered. It is important to be on the lookout for construction that may 'bypass' the system, such as laundry chutes, retractable projection equipment, huge wall cavities, bulkheads, skylights, furnaces, and air conditioning equipment, just to name a few.

Zerodraft's trained two-person crews use a specially formulated two-component polyurethane foam attic sealing kit as its primary air sealing system. The crew wears complete safety gear when

conditions in the home. They can be blamed on a whole range of 'usual suspects' - from inappropriate design, poor construction techniques and workmanship, poor communication between trades, location of heating/air-conditioning ducts,

ever they work in an attic. This includes a disposable Tyvek suit with hood, gloves, safety glasses and a respirator designed to cope with organic vapours. Two cylinders of foam are placed near the centre of the attic, perhaps across two beams for extra support. With a 30-foot hose assembly, it should be possible to reach almost every corner in most attics without moving the cylinders. If the existing insulation smells badly and prevents performance of remedial measures, it may need to be removed and replaced with new insulation.

Individual crews have their own preferences about how to divide the work, depending on accessibility and type of roof. Common sense suggests that the attic be divided into manageable sections. In each section, the first crew member exposes the top plates at the perimeter and interior walls by clearing any blown insulation and lifting batt or other insulation away from the area to be sealed. The second crew member follows behind and lays one or more continuous beads of foam from the attic sealing kit to seal the leaks. When the foam cures, the second operator lays the batt insulation back on top of the seal. The crew makes ventilation improvements as they proceed. Soffit vents are added or improved, taking into account homeowner preferences for exterior aesthetics.

Knee walls require top plates and joist cavities under the half-story to be sealed with foam and the vertical wall to be insulated using mineral fibre batts. Ventilation requirements are frequently coordinated with the roofer.

As the operators move along the top plates they can deal with any electrical or plumbing penetrations they encounter along the way. For pot lights, a drywall box can be built and foamed to seal the edges.

Heating ducts in attic spaces are a major cause of roof problems and are nearly always guilty of bringing warm humid air into the attic. They are often found in houses that have been converted from electric to gas heating. The ducts are frequently damaged, have leaky joints and are poorly insulated. All ducts must be airsealed and insulated to at least R25. The Zerodraft Attic Sealing Kit can be used to totally encapsulate the ducts and seal everything to the barrier plane.

Once all cracks, gaps, holes and leaks have been satisfactorily sealed, it is time to insulate. If air sealing has been done thoroughly, use blown cellulose as the preferred insulation, because of its superior air tightening capabilities.

Before completion, the attic entry hatch must be weatherstripped using a C-fold polyethylene clad foam compression seal. Then insulate to R-30 with 3 two-inch slabs of extruded polystyrene foam cut to the exact size of the hatch. Latch with a hook and eye to hold it down firmly. Prefabricated airtight insulated metal assemblies can also be used for hatches for kneewall entryways.

The last, but very important, area is addressing the source of the moisture. This could be due to lifestyle - many teenagers taking showers, for example - or it could be a below grade problem such as a crawl space with an earthen floor. Mechanical ventilation is essential in both cases.

For a crawl space with an earthen floor or known moisture problems, put a moisture barrier consisting of a layer of 6 mil polyethylene on top of the earth and hold it in position at the perimeter walls with two-component foam. Spray the walls with two inches of foam or use extruded polystyrene foam with the joints sealed using spray foam. Sprayed foam will also effectively seal the rim joist. Also seal off any outside vents into the crawl space (effectively, making the crawl space a "shallow basement"), and ensure that some household air can circulate through the space.

Be sure to check existing exhaust fans. Most are poorly installed and often exhaust directly into the attic instead of outside. In twenty years of home contracting, we have never seen an exhaust duct sealed. These situations must be corrected as part of the remedial measures.

The new business of comfort problem solving

In the home performance contracting industry, the question of what homeowners want, what they need and what they will buy is top of mind for the business owner and the marketing people. The question of energy and environmental performance is top of mind for policy makers. Fortunately, there are participants in this fledging market who believe that both should be top of mind. These are the people who are finding ways to "kill two birds with one stone."

Zerodraft is a good example. The company has made a point of turning market reality into a business opportunity. After twenty years of pursuing energy conservation contracting at the whim of government and utility subsidies, Zerodraft has created a profitable business out of solving home performance problems. The company defines the

problems it solves under the umbrella word 'comfort'. The problems cover a wide range of issues, such as health, safety, comfort, durability and energy efficiency.

Wet attics, ice-damming and other moisture related problems are creating a business opportunity for the comfort contractor. Why? Because other trades and interests are becoming aware of the risks and benefits that apply to their business: Roofers do not want to be blamed for problems they did not cause. They also see the added value of providing a service that solves a customer problem or need. Home inspectors have been caught unawares, and now realize the need to know more about potential problems. In Toronto last winter, a home inspector was sued for issuing a certificate without even going into the attic. The same goes for insurance companies, who face claims from homeowners for expensive repairs.

There is more: Energy efficiency guidelines indicate the potential energy savings from controlling air leakage. It is a side benefit, but one that appeals to policy makers, marketers and homeowners alike. Whatever you want to call your business - comfort, energy, performance, problem-solver - it is good to know there are still new opportunities for growth, profit, and job satisfaction.

Reinstallation of Gas Appliance Vents

The BC Gas Safety Branch has issued a bulletin reminding contractors carrying out building envelope repairs that all vents and vent terminations for natural gas or propane fired appliances must be removed during repairs, and must be replaced by a licensed gas fitter.

Improperly installed vent components can cause a blockage of the vent, impede the operation of the appliance, produce dangerous levels of carbon monoxide or even start fires. Natural gas or propane appliances or equipment that must be turned off, and removed must be placed in a safe location or removed from service before starting repairs. Gas supply lines must be capped off.

If vents or vent terminations are removed, covered, or located under protective coverings such as tarps, the appliances should have the natural gas or propane supply shut off and building occupants must be given written notice.

The gas fitter should attach a gas fitter's tag to each appliance that has had a vent or vent terminal reinstalled.