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Re-weatherstripping Old Windows: Better Than New Windows?

By Tony Woods

The cost of removing worn-out windows and installing new ones has never proved to be cost-effective in terms of energy savings. Expensive window replacement is usually justified on the basis of improved real estate value, aesthetics, or even the assumption that the old windows cannot be repaired.

Recent developments in weatherstripping techniques and testing methods, together with test results, have changed the equation. It is possible to salvage most types of operable windows at a cost that is justified by lower energy bills, longer window life, improved comfort and protection against rain penetration.

Uncomfortable drafts and water inside a building are the two most common factors when an owner decides whether or not an old window must be replaced. Recent before-and-after testing using portable equipment has shown that new techniques can create a window that outperforms both CSA and AAMA standards for air leakage and water penetration in new construction.

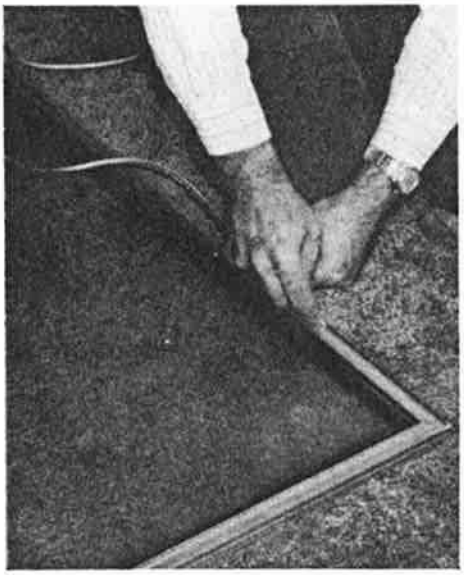
Re-weatherstripping techniques

The improvements recorded by one installer averaged more than a 60% reduction in air leakage and water penetration. Bill Boyd of CanAm Building Envelope Specialists Inc. says "testing has proved that air leakage and water penetration can be reduced to less than the new window standards requirement on most operable windows." His company is involved in researching building envelope improvement methods as well as using such techniques in both renovation and new construction, and has performed several successful window upgrades.

Several different types of operable windows can be found in most buildings. Boyd says that the new techniques have been used on aluminum sliders, sashless glass horizontal sliders and steel framed, factory sash casement windows.

Aluminum sliders of different kinds are by no means energy-efficient. Weatherstripping in this type of window typically consists of a low-pile cotton substance which deteriorates rapidly with use.

New techniques involve removing existing materials and putting in a polypropylene brush-type material with a plastic fin in the centre (*Schlegel Finseal*). Sometimes an additional 'dust-plug' is needed to deal with larger notches cut out of window meeting rails to allow for removal of sliders. Tests have recorded a reduction in leakage of up to 51% with these windows, and up to 75% on similarly-constructed patio doors.



Re-weatherstripping a window using modern pile type material incorporating a plastic film

Sashless glass horizontal sliders are a window style which was traditionally not weatherstripped at all. It has a plastic closure which traps it so that it cannot slide open without being pulled hard. It is commonly found on town houses and other types of row housing. Some of these windows have been updated with a piece of sash in the meeting rail (in a plastic track), so that they close better. Typically, the modern way of upgrading is to add a Polyflex preformed V-type vinyl extrusion. "Even when only the tops and the sides can be weatherstripped," says Boyd "leakage reduction of up to 74% has been achieved".

Historic buildings

Even very old leaded glass casement windows can be brought up to new standards cost-effectively. These windows are often warped, rusted and pitted, making the traditional gasket methods of weatherstripping impossible. In simple terms, the new technique consists of laying a bead of silicone caulking on the static frame part of the window where the operable part meets it. This bead is moulded to form an airtight seal by the action of closing the window.

Obviously, something has to be done to prevent the window from sticking closed after this procedure. To avoid this, first the installer cleans the surfaces to free them of grease, dust, flakes, dirt and rust particles; then the silicone bead is applied to the static frame. A release agent is then applied to the mating part of the operable

Caulking the static part of a casement window on an historic building

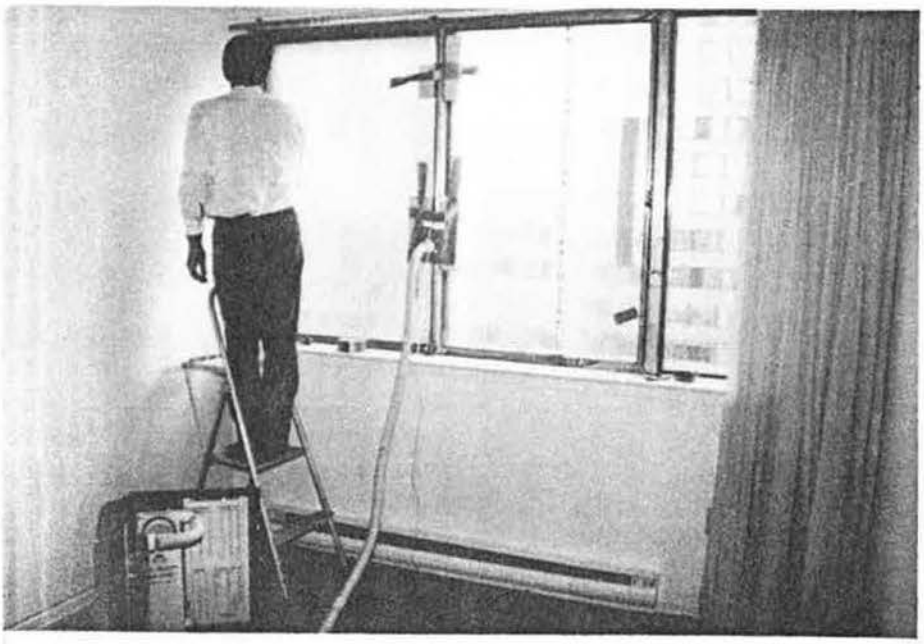
window which will contact the caulking.

The window is left closed for three days to allow the silicone to cure. It is then opened and the excess silicone trimmed. Test results showed a greater than 85% improvement after this method was used on Trinity College, an historic building at the University of Toronto.

Test methods

A special portable window kit for those who wish to perform their own tests is offered by Canadian Building Envelope Science and Technology (CanBest) of Brampton, Ontario, a company which has been very active in the window testing, both on site and in the laboratory.

First, the window is isolated with transparent film, by sealing it and the frame on the inside; then the enclosed space is depressurized to create a positive pressure on the outside of the building. When testing for air leakage, the amount of air required to create a 75 Pascal pressure differential across the window indicates its ability to allow air to travel through the leaks. The leakier the window, the more air is needed. Elie Alkhoury says "this enables us to see if it meets the requirements of the standard or the client. It is generally a fairly accurate guide, the only limit being windy or rainy weather conditions, which can effect your results."



Testing aluminum sliders for air tightness using a portable kit

Water penetration tests are conducted in a similar way, except that windows are pressurized to a higher level and water is sprayed on the outside through a calibrated grid of nozzles. There is no measurement involved, it is simply a question of pass or fail at seven different levels of negative pressure in the space (from 150 to 700 Pascals).

Alkhoury's company is often called in to advise owners on the question of window repair or replacement. He says "initially owners want to find out if a window can be saved rather than be replaced. The potential for improvement is assessed, and, based on that, owners decide whether to go for retrofit".

The main things to look at are the structure of the window, its general integrity from an assembly point of view, the way it was originally installed, notably its continuity with the barrier system in the wall, as well as ways to improve its performance. If it is a flimsy, low quality window, or was improperly installed, replacement may be recommended.

If, on the other hand, it was soundly structured and installed reasonably well, but has inadequate or non-existent weatherstripping, it is a good candidate for retrofit. This is very common, especially in historic buildings, where replacement is not an option.

Energy cost savings.

According to Anil Parekh, from Scanada Consultants Ltd. of Ottawa and Oakville, Ontario, windows remain a weak point in the building envelope and are " probably the last big loser in energy, comfort and durability."

In a report prepared for Ontario Hydro, Scanada concluded that "air infiltration and ventilation have a profound influence on both the internal environment and on the energy needs of buildings. Unnecessary high air change rates present an excessive burden on the building's heating (or cooling) system, resulting either in an unnecessary waste of energy or in the inability of the heating or air conditioning

system to satisfy thermal and comfort requirements.

"Problems relating to moisture migration, cold drafts and a generally uncomfortable living or working environment may also be experienced with high air leakages, so the control of air leakage in buildings has become a key element in achieving both energy conservation and indoor air quality."

In one demonstration project for Ontario Hydro, Scanada analyzed the potential reduction in peak electrical demand that could be achieved by reducing air leakage in different parts of an electrically heated 21 storey high-rise building in downtown Ottawa. Out of a total possible reduction of 83 kwh, 42%, or 38 kwh., was saved by reducing air leakage through the windows. All components of the building envelope were upgraded for air leakage control, including reweatherstripping the windows.

Tony Woods is Past President of the Ontario Building Envelope Council, 1991 recipient of that organization's 'Beckie' award for outstanding contribution to the industry, a Director of the National Energy Conservation Association, and a member of several CSA and CGSB committees. He is President of CanAm Building Envelope Specialists Inc., Mississauga, Ontario.

An easier and safer method for installing a roof ladder

The standard method of building and attaching roof ladders at gable ends is often difficult, time-consuming and potentially dangerous. This year's CMHC Job-site innovator award offers a system that is easier and safer than the standard construction method. The ladders can be built at floor level and passed up to the roof level and nailed into place. Both ends can be built and stood up at the same time.

After the exterior walls are in place and braced, nail the gable truss into place and brace with 2 x 4"s to the exterior wall. Mark out the top plates for truss locations. Before placing the first regular truss in position, lay it flat and support it if needed. Lift the ladders up from the ground or subfloor and nail them to this truss.

The fascia can also be nailed on at this time. Nail a clear neat the apex of the ladder to act as a temporary brace and to keep the joint tight. Lift the truss, align it with the center of the gable truss and nail in place. Nail lookouts to the top chord of the gable end truss.

The remaining trusses are now raised and aligned using a string guide. The fascia boards can be attached more easily and more safely using this technique.

This job site innovation was the winner of the 1991 Job Site Innovator Award sponsored by *Canada Mortgage and Housing Corporation (*CMHC). It was submitted by **Joe Chisholm** of Chisholm Contracting in Terrace, B.C.

Job-Site innovator Awards Program

CMHC encourages builders, renovators, and tradespeople to develop and share simple construction techniques that can make construction or renovation easier, faster or more cost-effective. These innovations must be new construction techniques that anyone in the building industry can use without special equipment or products.

Each year, CMHC and the Canadian Home Builder's Association recognize the best job-site innovations. These innovators are presented with Innovator of the Year Awards.

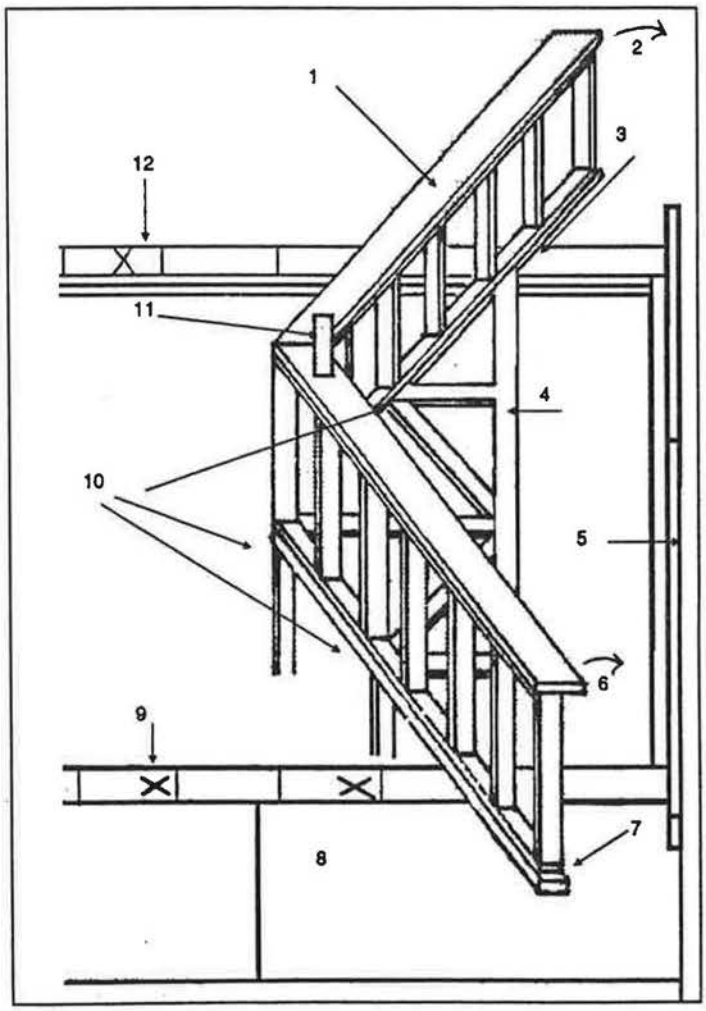


Figure 1. LADDERS ARE NAILED TO FIRST TRUSS AND HINGED OVER GABLE END.
Notes: 1. ladder; 2. ladder swings up to right; 3. hinge point; 4. roof truss; 5. standing gable truss; 6. ladder swings up to right; 7. 1"x4"; 8. wall sheathing; 9. top plate; 10. support truss here; 11. temporary cleat; 12. top plate.