

Understanding condensation

The problem of condensation in homes can be complicated and, at times, confusing. During winter months condensation is a visible problem only when water or ice form on the inside of windows. Condensation can cause more serious problems that cannot be seen. When house air, leaking into exterior walls or the roof, deposits water or ice inside these areas, the result can be water-sodden insulation or even structural deterioration of the home. By the time such problems become evident the damage is often done.

Condensation — the accumulation of moisture as liquid or ice — occurs when warm air comes in contact with a cold surface. The air cools on contact, cannot hold as much moisture and deposits the excess.

There are two types of air movement and it is essential to have a clear understanding of what they are. Let's start with the terms infiltration and exfiltration.

Infiltration is the movement of cold, dry outdoor air into your home through cracks and gaps in its exterior. Cold air cannot hold as much moisture as warm air, so when infiltrating air mixes with warm indoor air the tendency is for humidity levels to drop in the home. This is a normal condition in the majority of Canadian homes and explains why

most houses need humidification to keep air comfortable. Except in humid regions, such as coastal areas, infiltration shouldn't cause condensation problems.

Exfiltration is the flow of warm, moist room air out through gaps and cracks in a building. As this warm air contacts cool surfaces it holds less moisture and gives up excess humidity in the form of water, or, if the surface is cold enough, frost.

What makes one house react differently from another? Basically, air movement is caused by differences in pressure. Higher

pressure air wants to move towards lower pressure areas. Without getting too complicated it is safe to say that most older homes have high indoor air pressure. (This will vary within the house but on balance it will be higher than outdoors.) As a result, air leaves the house through chimneys and vents as well as elevated cracks and gaps. Replacement air enters the house through other cracks and gaps located on the lower portion of the house.

As you start caulking and weatherstripping these cracks and gaps, less dry air enters the living space and

indoor humidity levels rise. If this reaches the point where water starts to accumulate on cold window surfaces you have to cut down humidity by venting its sources, providing controlled amounts of dry outdoor air, mechanically dehumidifying or simply stopping the tightening up process.

Where exfiltration deposits moisture in hidden places in the building structure you have a house that has higher indoor air pressure without an adequate seal on inside surfaces to prevent the movement of air out into hidden cavities in the wall. The reasons for this can vary, but one documented cause is the closing of unused chimneys. The absence of chimney draft in a house heated with electricity or a high-efficiency gas furnace, for example, can cause increased airflow through cracks in the walls and roof.

None of these potential situations should be cause for distress. Dampness, peeling paint and rotting wall studs are easily avoided. Expert advice should be sought if you suspect hidden condensation or notice its symptoms. However, observing the following basic rules will prevent condensation problems and save energy and money over the long term:

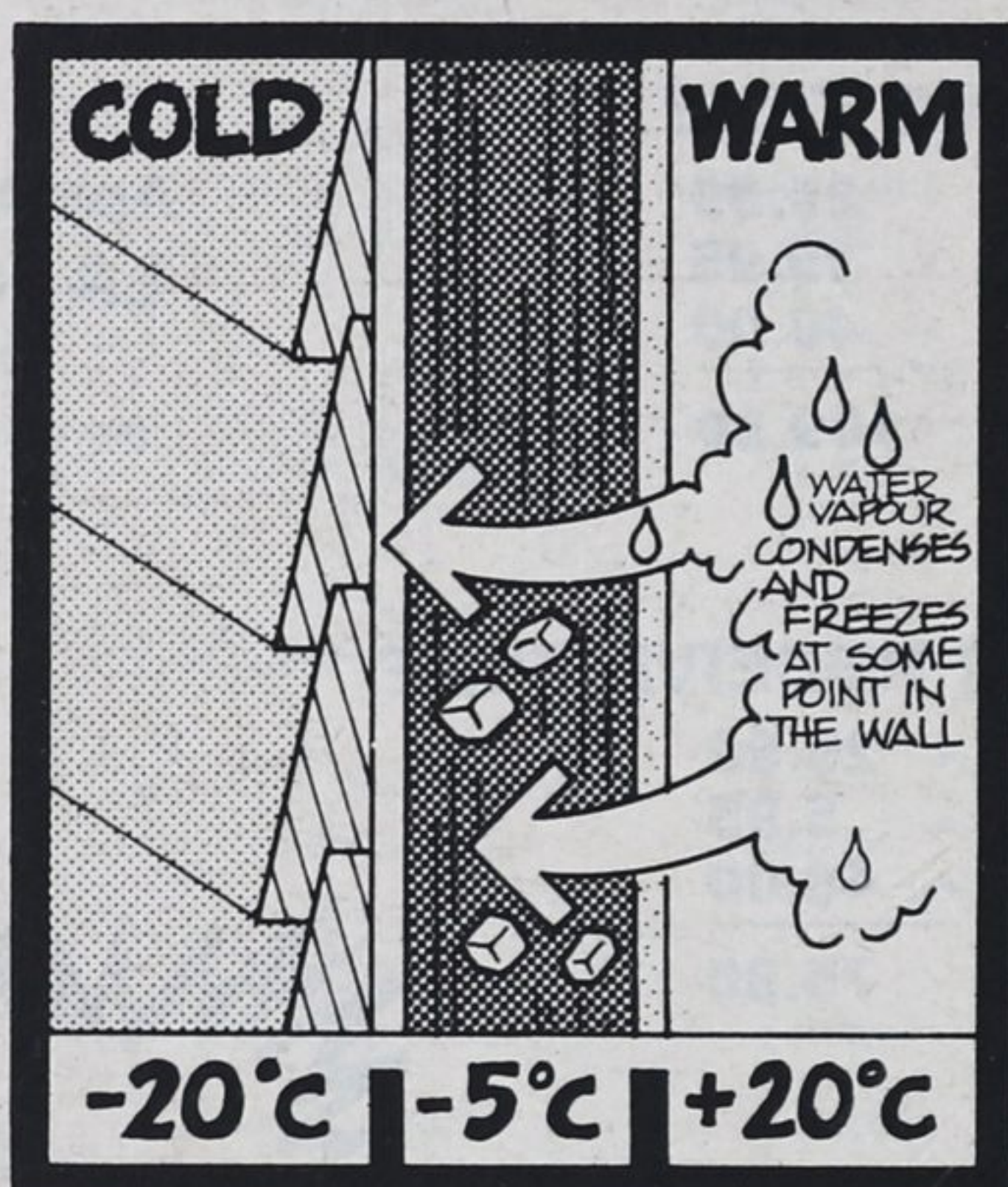
- Seal the house well from the inside with a polyethylene vapour barrier

(new construction), vapour barrier paint, caulking and weatherstripping. This protects against exfiltration and creates a situation you can control.

- Since moisture will get through to the insulated cavities of all but the newest houses it is important to prevent accumulation in these areas. To avoid this buildup, vent attic and roof spaces and make sure that exterior siding or cladding materials are not tightly sealed.
- Be aware of the interaction between the building

envelope and the heating system. Major alterations to the heating system that affect chimney outflow should be performed by a service technician who takes the condition of your house, with respect to airtightness, into account.

- Control humidity. Humidity can be controlled by venting bathroom, laundry and kitchen sources of moisture. A humidistat is a good investment — under 50 per cent humidity should be comfortable — and having a method of monitoring humidity will pay off in convenience.



CEILING FANS SAVE ENERGY

In homes with high ceilings, a ceiling fan can be an effective way to reduce heating costs. These fans eliminate the normal layering of the heated air, which can produce high temperatures along the ceiling while leaving the living area cool. A ceiling fan disrupts this layering by forcing heated air down, mixing and equalizing the room air temperature.

In rooms with a ceiling

height greater than 2.4 m (8 ft) the savings can be considerable. With the elimination of heat layering, thermostat settings can be lowered, resulting in fuel savings worth up to \$200 annually. The cost of operating the average fan is only a few dollars per month. Some models are available with a built-in thermostat control that turns the fan on whenever ceiling temperatures become excessive.

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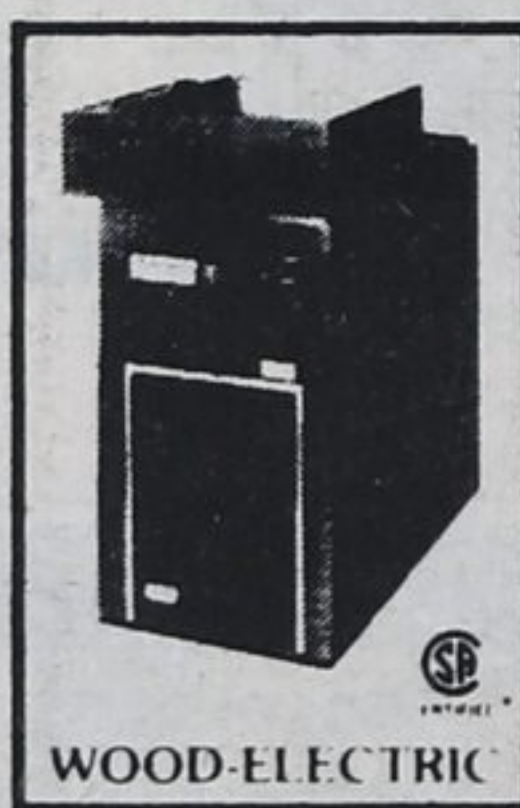
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