Understanding Condensation

Did you know that during the first 18 months, new homes or large addition can produce as much as 36 litres (8 gallons) of moisture a week; this moisture is released from building and finishing materials. As well, new, energy-efficient homes have a low air leakage rate, which means ventilation MUST be used to prevent the build-up of moisture from day-to-day activities. Large ceiling stains, mould growth, ice on window frames or water running down windows and walls are all signs of humidity issues that require immediate action.

Condensation is the change from water vapour to liquid water or ice on a cold surface. This occurs because air holds a limited amount of water vapour at any given temperature. Different surfaces in a home can be at different temperatures. Surface temperatures depend on insulation, air leakage, exterior air temperature and exposure to sun and wind. Usually, the coolest interior surface temperature exists on window glass and its edges. Moist, warm interior air coming in contact with these cold surfaces is cooled to the point where condensation occurs. The amount of condensation increases as the surface temperature of the interior glass gets colder or water vapour increases inside due to normal daily activities (i.e. laundry, showering, bathing).

Surface condensation in winter is a visible indication of high moisture content in the interior air or of very cold interior surfaces. It is a fairly common problem in homes, especially new homes. Interior surface condensation can occur on any cool surface – cold water pipes, toilet tanks, metal hinges, locks on exterior doors just to name a few. The most common concern expressed by home owners is humidity or moisture on their windows and window ledges.

Homes are also subject to concealed condensation, which can occur when warm moist air goes out through cracks, gaps or holes in the building shell (walls, floors or ceilings). It may also result when water vapour diffuses through building materials. Concealed condensation is not usually a problem, with moisture being carried away by natural air movement. However, if there are large deposits of moisture, it will create ice that will melt during warmer temperatures and can soak insulation, framing and sheeting materials, and destroy interior or exterior finishes (water staining, damp walls, musty odours, ceiling stains).

Condensation Problems, Causes and Solutions

Indication	Possible Cause	Suggested Solutions
Condensation on Windows	Abnormally high humidity Lower thermostat settings at night Sudden change to colder weather Poor air circulation	Control humidity levels by adjusting HRV settings ** Never turn the HRV off during times of high humidity Adjust temperature Improve air circulation by opening drapes/blinds, moving furniture or objects blocking heat registers and removing window screens during the winter months
Condensation on window frame only	Weather stripping Poor quality metal or plastic frames	Improve caulking and weather-stripping Replace windows with good quality units with a thermal break
Condensation on Doors	Un-insulated door High interior humidity levels	Replace door with insulated door Lower interior humidity levels
Condensation on door frame/threshold	Air leakage around door	Replace weather-stripping, threshold, caulking
Condensation on lock, knob, hinges	Air infiltration due to negative pressure inside	Replace weather-stripping; add fresh air duct to heating system Lower interior humidity levels
Condensation on walls	Poor air circulation Abnormal high humidity levels	Control interior humidity Run HRV/furnace fan continuously Improve air circulation: move furniture or objects blocking registers
Frost on basement wall	Air leakage High humidity	Air seal and insulate basement walls Use a dehumidifier to lower humidity levels