EASY$ TIP SHEETS

Energy Advice Saving Yukoners Money

Quick Links

What is condensation?

- Condensation on windows
- Hidden condensation

Causes and solutions

- Controlling humidity in your home

Humidity and Condensation in Your Home

Humidity is present in every home and building. While some amount of humidity is beneficial, higher concentrations can lead to condensation and mould development. With an increased awareness of the causes and places where condensation is most likely to collect, you can reduce its amount and effects.

What is condensation?

Air contains water vapour. The average family produces about 10 litres of moisture a day from activities like cooking, bathing, washing dishes and doing laundry. Condensation is the conversion of the invisible water vapour in the air back into a liquid and occurs when the vapour cools. The temperature at which the vapour begins to condense is called the dew point. Condensation occurs whenever warm, moist air comes in contact with a surface or object cold enough to chill the moisture in the air below its dew point.

As a rule, the coolest visible surfaces in a home in winter or cold weather, will be uninsulated cold water pipes, windows, exterior walls, hinges and locks on exterior doors. It is on these surfaces that condensation usually first becomes apparent. However, condensation may also occur in areas where it is not visible, such as in the attic and in exterior walls.

Goal and Summary

This Easy$ tip sheet will explain what condensation is, where it comes from, and where it is likely to collect in your home. It also provides a number of solutions to reduce the amount and effects of condensation in your home.

Condensation on windows may be little more than a nuisance, but condensation on window sills, walls and ceilings can cause paint to peel and promotes mould growth. Hidden condensation can lead to problems that range from mould and mildew to dry rot and damage to the wood-frame structure of the house.

Condensation on windows

Windows are usually one of the coldest surfaces in a house. Condensation forms on a window when warm moist air that contacts it cools rapidly. Like glass, metal is a poor insulator. If a window has a metal frame, condensation can also occur on the frame. Condensation on windows can be reduced and often eliminated by adding inside or outside storm windows or by installing multiple-glazed windows. If you are shopping for new windows, look for ENERGY STAR® labeled windows and sliding glass doors to replace your old ones. ENERGY STAR® windows not only reduce condensation, they also improve your home's comfort. If your windows need to be replaced and are too large, consider replacing them with smaller ones to reduce your heating costs further. Also consider replacing sliding glass doors with insulated doors and outside storm doors. For more information see the Easy$ sheets entitled "ENERGY STAR" qualified doors" and "ENERGY STAR, qualified windows".

Hidden condensation

Hidden condensation can occur when warm, moist air migrates into the walls, attic or other interior areas of the structure. Most of the moisture is carried into walls and attics by air leaking through openings for plumbing, piping, electrical boxes and wires, gaps between framing and drywall, attic hatches and other openings. If at some area in the walls or attic the moist air encounters a temperature below the dew point, condensation will occur. If the temperature is low enough, moisture may deposit as ice or frost. If the amount of moisture is small, it may change back into water vapour with a rise in temperature and be carried away by natural air movement. However, large deposits of ice can melt and soak insulation materials, ruin interior and exterior finishes, and lead to structural deterioration.

To minimize problems in attic and wall cavities, it is important to seal these cavities from the interior of the home to minimize the movement of moisture into these areas. It is also important that the cavities are vented to the outside through attic vents and 'breathable' exterior siding. This will allow small amounts of moisture that do get into the cavity to escape. For more information see the Easy$ sheets entitled "Draftproofing your home", "Good ventilation is important" and "Insulating for energy efficiency".

New housing is required to have a continuous vapour barrier, sealed at all penetrations. This requirement is intended to prevent, or at least severely inhibit, hidden condensation.

Causes and solutions

The combination of indoor moisture sources, air exchange rates, and cold surfaces will determine how much condensation occurs in the home. Activities such as cooking, washing, or bathing will raise the humidity level in your home and often result in some condensation on windows, walls and ceilings for short periods of time during cold weather. Other than causing some deterioration of the finish on wood frames, sills, or casings, such condensation is harmless. Therefore, moderate, intermittent condensation on windows, walls and ceilings is probably no cause for alarm. However, if windows are consistently wet, or water stains appear on ceilings or walls, prompt action should be taken to avoid further problems such as mould growth. Generally, the quickest and most effective response to a condensation problem is to increase the ventilation of the house. This can be done by means such as:

- Using exhaust fans that are vented to the outdoors, particularly when cooking, bathing, or washing.
- Opening doors and windows to increase the amount of outdoor air being brought into the house.
- Installing a heat recovery ventilator (HRV).

Controlling humidity in your home

Outdoor air, when heated to indoor temperatures, will generally be dryer than the air indoors. Thus, increased ventilation will reduce the amount of moisture in the air and, as a result, the amount of condensation, but it doesn't correct the cause. The cause should be located and corrected. The following table lists possible causes of high humidity in the home and suggests ways to control this moisture.

Causes of High Humidity	Ways to Control High Humidity
Cooking, drying clothes, showering and bathing	• use a range hood fan that is vented to the outdoors when cooking • cover cooking pots to reduce steam and conserve energy • use a clothes dryer that is vented to the outdoors, or an outdoor clothesline rather than hanging wet towels and clothes indoors. Note that your electric dryer may have been vented indoors as a heat-saving measure but this is not recommended any more. Also gas dryers must be vented to the outdoors. • operate vented bathroom exhaust fans during a bath or shower • take shorter showers
Humidifiers	• deactivate a furnace mounted humidifier • use individual room humidifiers sparingly
Lack of air circulation	• set your forced air furnace switch for summer operation – the fan will run constantly • use a two-speed fan on your furnace – set it to run continually at low speed, switching to high speed for the heating cycles • pull furniture and stored material away from exterior walls and up off basement floors • open drapes and curtains • leave closet doors ajar • leave bedroom doors open as much as possible • do not block or deflect warm air registers • do not close off unused rooms
Moisture-producing areas such as indoor greenhouses, indoor pools and hot tubs	• keep windows and doors to greenhouses, indoor pools and hot tubs closed • do not draw air from humid areas into the heating system • add a separate exhaust venting system
Exposed earth in basements or crawlspaces	• install ground cover, like heavy polyethylene or roll roofing, overlapped by 10 cm (4 inches) and weighted down or protected by a sand layer • ventilate the space in summer
Outside air supply to heating system is blocked or does not exist	• install a fresh air duct with a variable damper to allow a controlled amount of dry outside air into the home
No exhaust fans or underutilized exhaust fans	• install exhaust fans in moisture-producing areas like bathrooms, laundry areas and the kitchen • run fans for a few minutes after the activity to ensure moisture is removed • use only as needed since heated air is being exhausted • control exhaust fans with a dehumidistat, which only operates when the humidity rises above a preset level • ensure exhaust fans are vented to the outdoors

Causes of High Humidity	Ways to Control High Humidity
No Heat Recovery Ventilator (HRV)	• consider installing an HRV > an HRV provides a balanced ventilation system by constantly replacing the air it exhausts with fresh air > an HRV can recapture up to 80% of the heat from outgoing air > this is an expensive item; carefully weigh costs and benefits
Faulty or plugged chimney serving any fuel-fired appliance, such as a furnace or hot water heater	• have a heating contractor test your system > water vapour forms a large portion of the products of combustion, so unusually high moisture levels can signal a plugged or leaking chimney vent, which is a safety hazard and must be corrected immediately
New home or large addition	• increase ventilation rates for up to two years while new building materials dry > new building materials, such as lumber, concrete, drywall joint fillers and paint, contain large amounts of moisture
Extensive air sealing done to lower fuel consumption and cost	• upgrade ventilation systems because moisture that used to leak out must now be ventilated some other way to prevent high humidity in the home
Eliminating or blocking off a chimney	• upgrade ventilation if needed, to make up for eliminating this one major source of air leakage
Flooded basement or crawl space	• provide proper ground slope and weeping tile and gutters directed away from basement walls to help prevent flooding
Minor leaks and water sources	• try to identify and control the source • dry and store firewood outdoors. Drying wood produces a significant amount of moisture.

This Easy$ tip sheet is provided by the Energy Solutions Centre.

If you have additional questions or comments, please contact the Energy Solutions Centre by:

Phone: (867) 393-7063 or from the communities at 1-800-661-0408 ext. 7063

Mail: Box 2703 (EMR-206), Whitehorse, Yukon Y1A 2C6

Web: **www.esc.gov.yk.ca**

energy solutions centre

Yukon
Energy, Mines and Resources