



CONDENSATION



The facts about window & door condensation and what can be done about it:

- During winter months, homeowners often encounter condensation on the windows in their homes. The goal of this letter is to define the problem, the causes, and the solutions to this bothersome and ever-present problem.
- Of course, windows do not manufacture water. If you were out in the desert, you would want a canteen with you, not a window. But people seem to believe that windows do manufacture water. They call up window contractors and say, “My windows are all wet, and it must be the fault of the window.” Well, not quite.... Water on windows is condensation, and it can be a problem. However, it’s not a window problem, and the solution does not come from the windows.
- If you are troubled during the fall and winter by condensation on the windows of your home, you aren’t alone. It is a common problem in cold climates. The typical family produces a lot of moisture indoors (washing, showering, cooking, just breathing, etc.) and it can be difficult to reduce it.
- Understanding the causes of the problem is the first step in solving it. Condensation and ice form on windows because the window surface is below the dew point for the air near the window, so some of the moisture in the air condenses on the glass. The higher the relative humidity of the air near the window, the higher the temperature of the dew point.

Here are answers to your questions about condensation, indoor humidity and exterior condensation:

- Condensation is moisture that suddenly appears in cold weather on the interior or exterior of windows and patio door glass, drips on the floor or freezes on the glass.



- Seasonally, it can be an annoying problem. It may seem natural to blame the windows and/or doors. Interior condensation is really an indication of excess humidity in the home.
- Windows serve as visible areas for moisture to condense, warning you that there is too much moisture inside your home. Windows & Doors do not cause condensation.
- Exterior condensation, on the other hand is a form of dew-the glass simply provides a surface on which the moisture can condense.
- The important thing to realize is excessive humidity is causing window & door condensation.

Questions & Answers

1) Does Condensation occur in winter?

- Condensation is mostly common in winter, but it can occur whenever water vapour in the air meets a surface temperature lower than the dew point (the temperature at which air becomes saturated and produces dew). In rare instances, during spring & fall (and occasionally, during hot, humid summer days), exterior condensation can also form on windows. This is usually a good indicator of the presence of energy efficient windows.

2) Is this a sign of poor-quality windows or construction of my house?

- No, it is a sign of higher quality construction of windows, doors and your home construction. The newer home designs do not allow air and moisture escape of infiltration as the older homes, so it is very important to watch the humidity levels in the house.

3) How does indoor humidity affect window condensation?

- Excessive humidity is the cause of most window condensation. As the outside temperature drops, the window glass temperature also drops. When moist air meets the cold glass pane, the moisture condenses and forms water droplets. Determining when the condensation will occur and preventing depends on the energy efficiency of the window, the relative indoor humidity of the home, and the exterior and interior temperature.

4) Can excess condensation damage windows?

- Excess window condensation can cause paint to peel from the sash of wood windows. Excess moisture can also damage the wood window frame on a wood window. Normally it does not affect vinyl or aluminum windows.



- 5) Is exterior condensation anything to worry about?
- Dew on windows is a natural atmospheric phenomenon, and it **doesn't** mean your windows are leaking air or malfunctioning in any way. In fact, exterior condensation is a sign of energy efficiency, since it means the outside pane is thoroughly insulated from the heat indoors. Depending on where you live, it may occur just a handful of times per season.
- 6) Are there any cases where window condensation is only temporary?
- **New Construction:** Wood, plaster, cement and other building materials used in new construction and remodelling produce a great deal of moisture. When the heating season starts, this moisture will gradually flow out into the air in the home. It will usually disappear during the first heating season and not cause any further trouble,
 - **Heating Season:** At the beginning of the heating season, there may be a certain amount of temporary condensation. During the humid summer months, your house can absorb some moisture. After the first few weeks of heating, this moisture should dissipate.
 - **Preceding Temperature Shifts:** Sharp, quick drops in temperature can also create temporary condensation problems during the heating season.
- 7) How else can I reduce indoor humidity?
- Vent all gas appliances, clothes dryers and exhaust fans to the outside. Your attic and crawl space should also be ventilated. Cover the earth in the crawl space with a good vapour barrier.
 - When cooking, make sure to run the exhaust fans in the kitchen. When you bathe or shower, run the fans in the bathroom until your mirror is clear.
 - Avoid storing firewood in your house.
 - If your home is extremely "tight" it may be helpful to install an air-to-air heat exchanger. As the outside air temperature drops, you should also decrease the humidity level within your home. The bottom line: Maintain as high a relative humidity level as you can for comfort, then reduce the humidity level when condensation occurs. In many homes this simply means turning off your humidifiers in the winter.
- 8) Does the amount of condensation depend on the window type?
- Sometimes. Recessed windows like bow and bay windows usually experience more condensation than other window styles. This is because air circulated around those window types is usually more restricted, and since they hang away from the insulated house wall, bays and bows could be a few degrees cooler in temperature. Placing a common electric fan near the window to produce air circulation may also be helpful.



9) Do drapes and shades affect window condensation?

- Drapes and other window coverings can contribute to a condensation problem by restricting the flow of warm room air over the glass surface. Therefore, indoor condensation is more likely to occur when the drapes are closed, or the shades are pulled down.

10) Why wasn't it always there?

- Old drafty windows allow moisture to escape through inefficient seals and cracks. Today's technology produced more energy efficient, "tighter" homes. This is great for keeping your home more comfortable, quieter, and clean, BUT by sealing your home you are also keeping moisture in. In today's homes it is very easy to build up extremely high levels of humidity.

11) When should I be concerned?

- If you find condensation between the two or three layers of glass in an insulated window, the airtight seal has probably been broken, and the glass will need to be replaced. See Thermotek Windows & Doors Warranty at <https://thermotek.ca/warranty>

Condensation is the word used to describe what occurs when water vapour in the air is changed into liquid water on a cool surface. Air can hold only a certain amount of water vapour at any given temperature. If the temperature of the air is lowered by a surface, which is cooler than the air's maximum water-vapour holding capacity, condensation will occur.

When condensation appears on our windows, the immediate thought is that the window performance is inadequate. The culprit is not improperly installed or leaky windows at all. Your new windows are warning you of a possible excess of humidity in your home. If this problem is ignored, it can become far worse than the condensation and possibly form on your windows.

Interior surface condensation can appear on many different cool surfaces in your home, such as toilet tanks, cold water pipes, door hinges, windows and poorly insulated walls. The lower the level of humidity in your home the more likely you will be able to reduce costly damages.

Table below shows the maximum recommended relative humidity's for different outside temperatures. The chart shows that as the outside temperature drops, the relative humidity must also drop to minimize condensation. Improved ventilation will assist in reducing the amount of condensation, by increasing the temperature of the cold surface.



Outside Air Temperature in Degrees C

Outside Temperature in Degrees C	Relative Humidity with Inside Temperature of 20 Degrees C
-30 or below	Not over 15%
-30 to -24	Not over 20%
-18 to -12	Not over 25%
-12 to -6	Not over 30%
-6 to 0	Not over 40%

Sources of Moisture

The principal sources of moisture in a typical home are household activities, which vary with the living habits of the family. Some idea of the quantities of moisture released by these activities in a family of 4 is given in Table 2.

These figures show that approximately 7 - 9 litres of moisture per day may be introduced into a house with 4 occupants under normal living conditions. This level can increase to as much as 18 - 23 litres per day on washdays. An efficient humidifier may also increase this considerably. Moreover, when gas from a kitchen stove is burning a dishwasher is in use, moisture will be added to the air.

NOTE:

Watering a large number of household Plants can also create a lot of moisture in the air.

Moisture Produced by Various Household Activities for a Family

Activity	Moisture Produced - in Litres
Cooking (3 meals per day)	0.9
Dishwashing (3 meals per day)	0.5
Bathing – Showers	0.2
Bathing – Tubs	0.1
Clothes Wash (per week)	1.8
Clothes Drying (per week)	11.8
Floor Mopping (per 10m sq.)	1.4
Occupants (family of 4 per day)	5.5

When high relative humidity is a problem, steps should be taken to control the moisture sources. Although there is usually little that a householder can do to alter the normal cooking and bathing habits of the family, the weekly laundry should be dried outside or in a well-ventilated space inside the house. Automatic dryers and gas ranges should be provided with an exhaust vent to the outside, and humidifiers should be disconnected.



Several cases of condensation have occurred in buildings constructed over an improperly drained or unprotected crawl space. As much as 45 litres of water per day may be evaporated from exposed soil beneath the building when the ground is wet, and the surface is not covered with a water resistant membrane.

In new homes, considerable quantities of moisture averaging 2,200 litres may be released for the various construction materials. This will add considerably to the total moisture load during the initial 18- 24 months of occupancy.

How to Control and Improve Ventilation

1. Leave blinds and/or drapes open as wide as possible at night and open all window coverings during the day. This will increase the warm air circulation over the cool surface and increase temperature of the glass.
2. Check the furnace filter and replace it if dirty. A dirty furnace filter will reduce the output of the furnace fan. A clean filter will ensure maximum flow.
3. Turn your humidifier off during the winter and anytime the temperature falls below 0 degrees C.
4. Always turn on the bathroom fan when bathing or showering. The best results are achieved when the fan is ducted directly to the outside. Humidistat controlled fans, which automatically turn on when the humidity exceeds the setting on the switch are also available. Running the fan will also help reduce the fogging of bathroom mirrors.
5. Always turn on the stove fan when cooking. For best results, make certain the fan is ducted directly to the outside.
6. Ensure your clothes dryer is properly ducted to the outside, no air leakage is present in the duct, and the duct is free of all blockages. Avoid hanging clothes indoors to dry.
7. Ensure the fresh air intake for the furnace is free of all blockages. If your house has no fresh air intake to the furnace, have one installed.
8. Ensure all hot and cold air registers are clear of any obstruction as this could affect maximum air circulation. Avoid the use of air deflectors. Air deflectors directed towards the room will result in ineffective circulation over the window area. Air deflectors directed towards the window can result in thermal cracks in the glass.
9. Install ceiling fans in locations where heat registers are not located close to the windows. The increase in airflow will definitely help reduce condensation on these windows. Ceiling fans should be run continuously in houses where the relative humidity is above recommended levels.
10. Floors wet from mopping can add large amounts of moisture. Run exhaust fans while floors are wet and avoid washing floors on extremely cold days.
11. Wipe up any excess snow or moisture tracked into the house. The evaporation of this moisture will result in an increase in the relative humidity level.
12. Run your furnace fan continuously. Most furnaces are equipped with a switch, which



allows the furnace fan to operate even when the furnace is not producing heat. If your furnace is not equipped with this type of switch, have one installed.

13. Open doors and windows periodically to allow the dry outside air to replace the moist inside air.

14. Ensure there are no leaks in the water pipes or drains.

15. Ensure window and door frames are caulked where they meet the exterior finish of the house. This reduces the possibility of cold air infiltration which may lower the inside temperature of the window or door.

16. Remove interior screens in the winter to allow better ventilation over the window surface. Screens will hamper the flow of air over the interior surface

Condensation can be an early visible warning that the relative humidity in your house is too high. Following the above steps should ensure that the humidity level is balance to provide comfort for the occupants, as well as reducing the risk of moisture damage to the house, and condensation on the windows.

If you maintain a high level of humidity within the house, then surface condensation may occur when outside temperatures are low.

Facts and Tips for Controlling Humidity

A new home will typically expel 500 to 600 gallons of water in the first year and a half, so it is difficult to reduce condensation during this time.

It is normal to have about 1" of moisture on a sealed unit.

Sliders will typically have more condensation on the fixed portion due to the glass being positioned further toward the exterior than the interior.

Ventilation is the most effective means to remove moisture from your home. By exchanging some of the drier outdoor winter air for warm humid interior air, the moisture level inside the house will be reduced.

Open a door or window for short periods to allow moisture to escape.

Gas appliances produce moisture from combustion. Cooking adds even more moisture, so be sure to run your kitchen fan while cooking. Vent the kitchen fan directly to the outside to achieve the desired effect.

Showers are a high source of moisture. Keep bathroom doors shut and run the exhaust fan to eliminate moisture. Ensure you leave your fan on for a minimum of 15 minutes after you shower to allow the humid air to be removed to the outside.

Clothes dryers should be vented to the outside. Hanging up wet clothes to dry inside your home can add significant moisture to your home.



Shut off the furnace humidifier and any other humidifying device in the home, particularly in winter months.

If you have a fireplace, open the damper occasionally to allow moisture to escape.

Free air circulation is important. Do not cover hot or cold air registers with furniture or appliances. Leave bedroom and bathroom doors open.

Keep the temperature of all rooms at a minimum of 10°C (50°F) even if unoccupied. Condensation will occur in an unheated room.

Condensation will typically be greater on the second floor due to the fact that warm air rises, and the upper floors are exposed to greater winds, cooling the glass.

Wipe up any tracked-in snow before it melts and evaporates.

Floors wet from mopping can add large amounts of moisture. Run exhaust fans (bathroom and kitchens) while floors are wet. Avoid washing floors on extremely cold days.

Most builders install a fresh air intake into the cold air return duct of the heating system. Make sure that the intake damper is open and that there are no obstructions to prevent airflow. If you do not have a fresh air intake, have one installed.

Drapes and blinds should be left open during the daytime. At night, raise blinds at least 4" up (preferably 6-8") off the frame to allow air to flow against the glass.

Certain fabric blinds that are designed to fit from jamb to jamb must be left partially open to ventilate the window cavity. Failure to do this can cause extreme temperatures between the blinds and the glass. Glass breakage or warping of PVC can occur, which can void warranties.

Remove casement screens to increase airflow.

Window Convection & Drafts

At Thermotek Windows & Doors we take great pride in providing our customers with the service and information they need to understand and care for the products they have purchased. We are always available to assist you, and we want to produce you the best customer service available. The following information is designed to address some common questions and concerns.

Drafty Windows: Windows can be drafty for a variety of reasons such as cracked caulk, improper window locking, interlocks that are not lined up to seal properly,



damaged or missing weather stripping, and poor insulation within the interior walls. These types of problems are easy to remedy.

Convection: However, windows may seem “drafty” for another reason; namely a process known in physics as convection. Convection can lead you to believe that your windows are drafty. Convection occurs when air gives up its heat to the cooler glass and sinks towards the floor. This movement sucks new, warmer air towards the glass that is in turn cooled, creating a draft. What you are experiencing is the process of warm air forcing colder air to move due to differing density properties. Heated air circulates through the home. When it reaches window glass it effectively pushes the existing cold air off of the glass. Convection is proof that your new windows are working well and energy efficient.



Tips to Reduce Convection:

Leave your blinds or window treatments open about 1/4 inch, so that heated air can reach the glass.

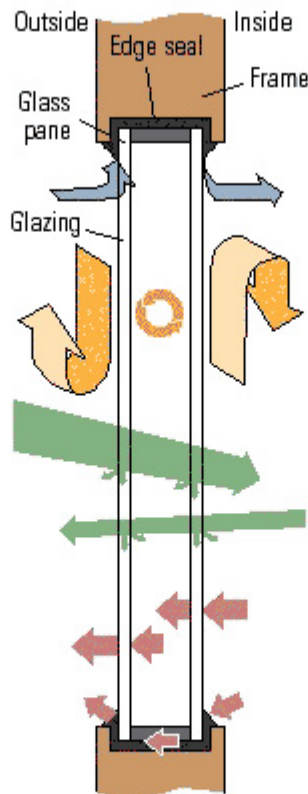
Make sure that your heat register exchanges are not obstructed by couches or other furniture.

Infiltration

Air leaks around the frame, around the sash, and through gaps in movable window parts. Infiltration is foiled by careful design and installation (especially for operable windows), weather stripping, and caulking.

Radiation

Radiation is energy that passes directly through air from a warmer surface to a cooler one. Radiation is controlled with low-emissivity films or coatings.



Convection

Convection takes place in gas. Pockets of high-temperature, low-density gas rise, setting up a circular movement pattern. Convection occurs within multiple-layer windows and on either side of the window. Optimally spacing gas-filled gaps minimizes combined conduction and convection.

Conduction

Conduction occurs as adjacent molecules of gases or solids pass thermal energy between them. Conduction is minimized by adding layers to trap air spaces, and putting low-conductivity gases in those spaces. Frame conduction is reduced by using low-conductivity materials such as vinyl and fiberglass.

Source: E SOURCE