



Condensation

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 your windows, the immediate thought is that the window performance is inadequate. In reality the culprit is not improperly installed or leaky windows. Your 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 ice 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 damage.

Table 1 shows the maximum recommended relative humidities for different outside temperatures. The chart shows that as the outside air temperature drops, the relative humidity must also drop to minimize condensation. Improved ventilation will also assist in reducing the amount of condensation, by increasing the temperature of the cold surface.

Table 1:

Outside Air Temperature (in °C)	Relative Humidity w/ inside air temp @ 20°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 principle sources of moisture in a typical home are the 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 four is given in table 2.

These figures show that approximately 7 to 9 liters of moisture per day may be introduced into a house with four occupants under

Table 2:

MOISTURE PRODUCED BY VARIOUS HOUSEHOLD ACTIVITIES FOR A FAMILY OF 4	
Activity	Moisture Produced (L)
Cooking (3 meals per day)	0.9
Dishwashing (3 meals per day)	0.5
Bathing in Shower	0.2
Bathing in Tub	0.1
Clothes washing (per week)	1.8
Clothes drying (per week) indoors	8.6
Clothes drying (per week) indoors with unvented dryer	11.8
Floor Mopping (per 10m sq.)	1.4
Occupants (family of 4 per day)	5.5

normal living conditions. This level can increase to as much as 18 to 23 liters per day on wash days. This may also be increased considerably by an efficient humidifier. Moreover, when gas from a kitchen range is burning or a dishwasher is in use, moisture will be added to the air. Note: watering a large number of plants can also create a lot of moisture in the air.

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, weekly laundry should be dried outside or in a well ventilated space inside the house. Automatic driers and gas ranges should be provided with an exhaust vent to the outside, and humidifiers should be disconnected.



Condensation (continued)

Several cases of condensation have occurred in buildings constructed over an improperly drained or unprotected crawl space. As much as 45 liters 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 liters may be released from 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 the temperature of the glass.
2. Check the furnace filter and replace 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 is also available. Running the fan will also reduce the fogging of bathroom mirrors.
5. Always turn on the range fan when cooking. For best results, make certain the fan is ducted directly to the outside.
6. Ensure your clothes drier 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 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 a 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 air flow 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 cold days.
11. Wipe up any excess snow or moisture tracked into the house. The evaporation of the 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 air outside to replace the moist air inside.
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 for better ventilation over the window surface. Screens will hamper the flow of air over the interior surface.
17. Patios, decks, and landings: Do not stack patio furniture or other articles near or against windows that directly cause shading or "cold spots" on your windows and doors. This reduces the effectiveness and performance of the glass. This can also lead to glass cracking (see glass cracking section).

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 balanced to provide comfort for the occupants, as well as reducing the risk of moisture damage to the house, and condensation on the windows.