



# The Root Causes of Condensation

During winter and other damp seasons, many questions will arise regarding condensation.

**Why do windows sweat and fog?** It's the same event that your drinking glass produces on a hot summer day. Condensation forms when warm water vapor in the air comes into contact with any surface with a cooler temperature. The warm air containing the water vapor is cooled by the surface of the glass, which causes the air to release excess water. The result: drops of water appear on the exterior of the cool glass.

Modern homes are well sealed against air leakage. This improves heating and cooling efficiency, but traps moisture in the air. This leads to high humidity. If you have high levels of humidity with poor air circulation, your windows will become dehumidifiers and condense water from the air until the relative humidity level inside drops.

The lower the U-value of a window, the better the glass can handle humidity and keep condensation from forming. High performance windows are less likely to form condensation with the same humidity, all else being equal, but the capabilities of the window may be maxed out by your home environment.

Newer windows with better sealing properties can actually increase window condensation because new windows intentionally reduce air leakage and ventilation.



During winter, moisture generated by our everyday activities can lead to higher humidity levels in the house. **What to do?** First, you need to reduce the humidity level in your home.

- Use kitchen exhaust fans when cooking
- Use bathroom fans when showering
- Vent clothes dryers to the outside and
- Make sure furnace air exchangers are working

Air circulation inside a home is also a factor. Blocking windows from warm interior air flow can create a cooler **micro climate zone**. This can create condensation and frost even with lower humidity levels. **What to do?** Air should be allowed to flow around and over the window areas.

- Do not cover windows with heavy drapes or blinds
- Do not block furnace air vents near windows
- Do not place décor or furniture against windows
- Remove interior insect screens

## Quick Humidity Level Guide

During the heating season, when the outside air temperature is below 15°F (-10°C), the relative humidity should not exceed 30%. In very cold weather, the humidity will need to fall below 30% to prevent condensation or frost on windows.

The University of Minnesota has developed guidelines for the minimum recommended humidity levels for houses. Based on a 70°F interior room temperature, engineering studies established the following guidelines:

Outside Temperature	Inside Humidity
20° to 40°F (-7° to 5°C)	Not over 40%
10° to 20°F (-12° to -7°C)	Not over 35%
0° to 10°F (-18° to -12°C)	Not over 30%
-10° to 0°F (-23° to -18°C)	Not over 25%
-20° to -10°F (-29° to -23°C)	Not over 20%
-20°F or below (-29°C or below)	Not over 15%

These guidelines do not guarantee that condensation will not appear on mirrors or windows. Factors such as closed blinds or drapes may require you to decrease the relative humidity in your house below these guidelines.



### Insulated Glass Units

In rare instances, the dual pane or triple pane unit may fail. If there is seal failure in the insulated glass assembly this will manifest as fogging in between the panes. The fog and moisture will not be able to be wiped away. Failed IG units will need to be replaced.