

# Reducing Condensation in Your Home



SIMONTON®  
WINDOWS

# What Causes Condensation

Under the right conditions, condensation can occur both inside and outside your home. The source of condensation, or “sweating” on windows and mirrors inside a home is caused by humidity, or invisible water vapor, present in virtually all air. When this water vapor comes in contact with a surface, which is at a temperature below what is called the “dew point,” the vapor turns to visible droplets of liquid, or condenses on the cooler surface. This often happens to bathroom mirrors and walls after someone has taken a hot shower. Condensation can also occur on windows during the winter if the inside humidity level is high enough.

When it comes to condensation outside your home, it is simply a fact of nature. Exposed to certain conditions, like a clear night sky, still air or high relative humidity, the exterior surface of the glass can radiate heat away from your

home and into the night air - allowing the glass temperature to fall below the dew point of the ambient air and create condensation. Only when the glass temperature rises above the dew point will the condensation evaporate back into the air. Common examples of this is when dew forms on grass, car hoods and roofs.

We tend to notice condensation only on windows, mirrors, etc., because the glass does not absorb the excess moisture and is simply more visible there. A little condensation, or “fogging” now and then is to be expected and causes no problems. Of more concern, however, is the less visible condensation that can penetrate and collect in walls and ceilings. Excessive condensation can cause damage.

When you see consistent condensation on glass surfaces, take it as a warning that you may have an excessive humidity level in your home.

## Balancing Humidity for Comfort and Condensation Prevention

Controlling the amount of moisture in the air, or humidity, is the most effective way to reduce condensation. The amount of moisture in the air is indicated by the “relative humidity” of the air. Relative humidity is the percentage of moisture in the air compared to the maximum amount it

can hold. For instance, when it is raining or very foggy outside, the outdoor relative humidity would be 100%. Temperature also effects how much moisture air can hold. At 100% relative humidity, air at 60 degrees will hold three times as much water vapor as air at 30 degrees Fahrenheit. As temperatures drop during the winter, the air can not hold as much moisture as before and condensation will occur unless the relative humidity level is lowered.

### Maximum Recommended Humidity Levels

*Based on engineering studies conducted at The University of Minnesota Laboratories.*

Outside Air Temperature	Inside Relative Humidity
-20° F or Below	Not Over 15%
-20° F to -10° F	Not Over 20%
-10° F to 0° F	Not Over 25%
0° F to 10° F	Not Over 30%
10° F to 20° F	Not Over 35%
20° F to 40° F	Not Over 40%

The chart illustrates the maximum recommended levels of moisture in interior air for different outside temperatures. You can check the relative humidity levels in your home using a hygrometer, an electronic humidity gauge or a sling psychrometer. Follow instructions carefully, because a reading in the middle of a room will yield a different result than a reading taken near windows. Once you've determined the humidity level in your home you can take appropriate actions.

- Based on engineering studies at 70° F conducted at the University of Minnesota Laboratories.
- Relative humidity levels above these are not recommended at the low outside temperatures indicated, unless special provisions are taken in building construction.
- If higher relative humidity levels are required because of special interior environmental conditions, the window manufacturer should be consulted.

# Some Thermally Efficient Windows Resist Condensation Better Than Others

Engineers have established the Relative Humidity Condensation Point to show the resistance a window has to condensation within the home. The percentage shows the relative humidity level at which water vapor or other liquid vapor begins to form on the frame or sash, based on an inside temperature of 70° F and an outside temperature of 0° F. The higher the percentage, the more moisture the air can hold before condensation will occur.

Innovative technology has allowed us to manufacture windows that are more and more energy efficient, producing higher R-values and lower U-values. The R-value is the resistance a material has to heat flow. The higher the R-value, the greater the resistance. The U-value is the total amount of heat transferred through a material. The lower the U-value, the slower the rate of heat flow and the better the insulating quality. And that adds up to a more condensation resistant window and door.

For example, the table below shows how the addition of advanced thermal technologies produce a higher Relative Humidity Condensation Point, and improved R- and U-values.

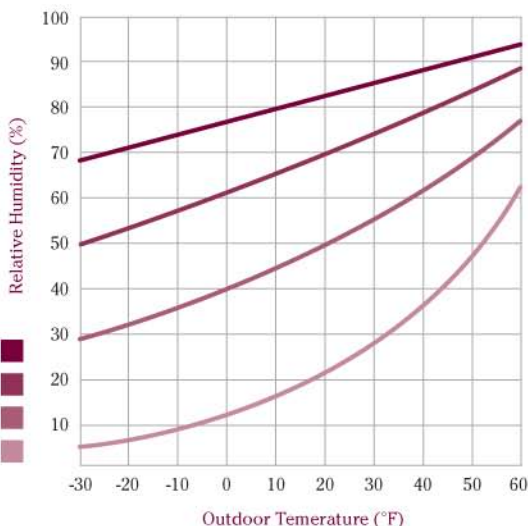
## Relative Humidity Condensation Point for Simonton Picture Windows

Window Style	Glazing	I.G. Thickness	Gas in I.G. Unit	Total R-Value	Total U-Value	Spacer System	Relative Humidity Condensation Point
Picture	Clear/Clear	7/8"	Air	2.08	.48	Intercept®	41.2%
Picture	Low E <sup>SC</sup> /Clear	7/8"	Argon	3.45	.29	Intercept®	62.2%
Picture	Low E <sup>SC</sup> /Clear	1"	Argon	3.57	.28	Super Spacer®	62.2%

- Calculations based on vinyl 48" x 48" Picture window without grids.
- The relative humidity percentage measurement applies only to the center of glass. Condensation will form more quickly at the edges of the glass.

This graph demonstrates the condensation potential on the center of glass area when different glazings and gasses are part of the window. On or above each curve, the conditions are appropriate for condensation to occur. Below the curve, condensation will not occur and it is very clear that as the U-value of the windows improve with enhanced glazing and gasses the occurrence of condensation decreases.

- Triple-glazed, two Low E surfaces, Argon-filled glass
- Double-glazed, Low E/Argon-filled glass
- Double-glazed unit
- Single-glazed unit



- Values are based on winter conditions: 70° F indoor air temperature, 15 mph outdoor wind velocity and no incident of solar radiation.
- Source: Lawrence Berkeley National Laboratory. Values based on center-of-glass temperatures. Condensation may occur at lower humidity levels on the glass edge.

# Do Thermally Efficient Windows Prevent Condensation?

There is no such thing as a condensation-free window. Even walls will “sweat” under conditions of high humidity. Remember that windows do not cause condensation; they simply prevent the moisture from escaping to the outside and serve as a highly visible surface where condensation can be easily noticed. If inside glass surfaces on double- or triple-glazed windows show excessive condensation, you can be reasonably sure that moisture is also collecting in your walls and ceilings. When outside condensation occurs, this does not mean your insulating glass unit is defective. In fact, it shows that the unit is doing its job - insulating the building from the environment.

## What can I do to help with condensation?

Most everyday activities produce water vapor. One shower produces a 1/2 pint of water vapor, a houseplant generates 1 pint of water vapor a day and one person's breathing produces 3 pints of water vapor per day. Although it's an uphill battle, there are a few things you can do to help control moisture levels in your home.

- Use kitchen and bathroom exhaust fans.
- If you have a humidifier, set it to correct outside temperature.
- Properly vent clothes dryers, gas appliances, stoves, etc.
- Make sure attic, basement and crawl spaces are well ventilated and free from obstructions.
- Don't store firewood inside, a cord of wood can release 60 gallons of water.
- Crack a window in the bathroom, kitchen and laundry room after during and after use.
- Install energy-efficient windows.



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