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THE PROFESSIONAL WAY

CONDENSATION, HUMIDITY AND DEW POINT TEMPERATURE

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WHAT IS CONDENSATION?

Condensation, or moisture on surfaces, generally occurs inside the home when it is extremely cold outside and the humidity level inside the home is at a higher level than recommended.

Condensation will show in the form of moisture, and will be seen on cooler surfaces, such as glass, astragals, hinges, and hardware. These surfaces are more susceptible because they are closer to the outside vs. an inside wall or table.

UNDERSTANDING INTERIOR CONDENSATION

Condensation can be visible across interior window surfaces, which is odd because windows made of glass and vinyl are not capable of making surface water. ***Why is it happening?***

Condensation occurs when the temperature of the surface is colder than the Dew Point temperature. ***What is the Dew Point temperature?***

Dew Point is the temperature of the air when the air is 100% saturated with water, even though you cannot see the water. ***What does that mean?***

The air temperature inside the home, mixed with the humidity or moisture level inside the home, will establish the Dew Point temperature, which is always lower than the inside air temperature. Downloading a free Dew Point app will help. Once you enter the temperature and humidity level, the app will define the calculated Dew Point temperature.

If a surface inside the home is colder than the defined Dew Point temperature, then condensation will occur on that surface. ***Why?*** The following is a simple example to show what happens:

- Obtain a glass, fill it with ice, add water and set it aside. After a while there will be moisture on the outside of the glass. That might make you wonder "Is the glass leaking?" The answer is obviously no. ***Then where is the moisture coming from?***
- Because the glass is cold, the air surrounding the glass is getting colder. Once the air temperature drops below the established Dew Point temperature, the air cannot hold any more water, so the water will leave the air and propagate on the colder surface.

HOW DOES UNDERSTANDING CONDENSATION APPLY TO WINDOWS?

To determine this, it can be easier to start by obtaining the outside temperature, because the outside cold temperature will affect the inside glass and vinyl temperatures. The colder it is outside, the colder the inside surface temperatures will be.

Measuring the outside and inside temperatures help, but the 30 degree rule is easier and brings this together. Glass for windows is typically dual pane with argon (DLA), so you can expect the window surfaces to have a 30-degree temperature difference from outside to inside. For example, if it's zero degrees outside, the inside glass and vinyl surfaces should be around 30 degrees.

When applying this to the Dew Point temperature, if the inside glass surface temperature is below the established Dew Point temperature, then water will leave the air and lay on the glass surface.

HOW TO PREVENT CONDENSATION

To keep condensation from happening, the inside humidity level must be reduced enough to lower the Dew Point temperature, so it's below the temperature of surfaces that are condensating.

- Changing to a triple pane glass package could help, but the window's vinyl surfaces will still remain at 30 degrees and have condensation. Another reason why the 30-degree rule applies well.

This applies similarly to entry doors, but the 30-degree rule may not always be the same. Door slabs can measure around the 30-degree difference outside to inside, but hardware could be less.

Condensation on inside surfaces of the home is controlled by the homeowner. Remember, windows and entry doors are not capable of making water.

Also, it's best to use a digital meter when measuring inside temperature and humidity levels along with using a temperature laser to measure condensating surface temperatures.

WHAT CAUSES MOISTURE IN THE HOME?

Moisture in the home can be caused by people taking showers, cooking food, doing laundry, or when a large group of people are in a room together. With closed curtains where air movement is restricted, the air closest to the window remains cool and can also condensate. Elevated moisture levels can also lead to mold and rot in unseen areas of the home.

Reducing the humidity percentage inside the home when it's cold outside usually solves the problem. A higher humidity may not cause an issue when outside air temperatures are 30° and higher, but when the outside temperatures drop below freezing to near zero while maintaining the same inside level of humidity, condensation will be an issue. Differences in inside and outside air temperatures, combined with different humidity levels inside will determine when condensation occurs. If moisture is collecting on the inside glass, hinges, etc, identify and reduce the cause of the excess moisture in the air.

An example of elevated humidity is a fogged mirror in a bathroom after someone takes a shower. The air is in an enclosed space and is saturated with moisture from the shower and then lays on adjacent surfaces that are cooler. Once the door is opened, the excess moisture will mix with dryer air outside and the condensation will go away.

This *Humidity Selector Chart* shows required humidity levels to eliminate condensation. **These are only estimates and factors such as airflow, insulation value, etc. can change the point at which condensation begins to form.**

		Inside Temperature (F)			
		60°	65°	70°	75°
Outside Temperature (F)	0°	20%	17%	14%	12%
	5°	25%	21%	18%	15%
	10°	32%	27%	22%	19%
	15°	39%	33%	28%	23%
	20°	48%	40%	34%	28%
	25°	58%	48%	41%	34%
	30°	70%	58%	49%	41%
	35°	84%	70%	59%	50%

WHAT CAUSES EXTERIOR CONDENSATION?

Exterior condensation happens when the Dew Point Temp is higher than the surfaces that have condensation. At night, as outside temperatures drop, so do surface temperatures on items such as exterior window glass, siding, grass, and cars.

In the morning when the air temperature starts to rise and the humidity levels increase, the Dew Point temperature rises faster than the surfaces still cool from the night before. When this happens condensation will form on these cooler surfaces.

When the outside temperature warms these surfaces, the moisture will dissipate away. The window is working as designed and acting like an exterior wall, keeping the moisture outside and warm air inside.

WHY DIDN'T THIS HAPPEN ON MY OLD WINDOWS?

Older less energy-efficient windows allowed warmth from inside the home to reach the outside glass pane, keeping it warmer than the Dew Point temperature, so moisture could not form.

Newer, more energy-efficient windows will not allow as much warmth from the inside to reach the outside glass pane, therefore the outside pane remains cooler than the Dew Point temperature, allowing condensation to form.

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