

## **Exterior Condensation and New Energy Efficient Windows**

Focus on energy efficiency and technological advancements in building materials did not spare windows and doors. The fenestration industry keeps on evolving by embracing new technologies and producing windows and doors with better insulating values than the ones produced only a few years ago. As a result of increases in thermal performance of these products, our homes are better insulated, we consume less energy to keep them warm and they are more comfortable to live in.

Recently amended building code, now for the first time, includes the minimum thermal performance levels for the fenestration products. Meeting these criteria is not possible without the use of low emissivity glass, commonly referred to as Low-E Glass.

There are several types of Low-E glass on the market, with differing performance but in most cases their primary goal is to keep the heat inside the house and block it from easily escaping to the outside world.

As always in life, many pros of using an advanced glazing in today's windows and doors outweigh a few cons but these few cons, if not disclosed and explained, may cause some anxiety for the end users, the dealers and the manufacturers.

One of them is the occasional appearance of condensation on the outside pane of glass.

This phenomenon is not frequently encountered and it can be observed or is expected to be present for a reasonably short period of time. Although, it can occur at any time of the year, late summer and early fall typically provide the right mix of conditions for it to affect certain windows.

Explaining external condensation in layman's terminology is easier when using the commonly found example of taking a cold beverage can out of the fridge and putting it next to one that has been at room temperature. The cold can will attract the moisture out of the surrounding air and it will become covered with droplets of water that condense on it. This will only take place when the temperature of the can is colder than the temperature of the air in the room. The one that had the same temperature as the room will remain dry. Consider also pouring a cold beverage into a glass, leaving it half empty, or if you prefer, half full. The condensation on the exterior surface of the glass will only be present on the lower half.

Let's apply this logic to what takes place around the windows. The old and inefficient windows used to allow for a fairly easy transfer of heat to the outside environment that is cold. When traveling to the outside, the heat would warm up the glass panes that it passes through, keeping them slightly warmer than the ambient or surrounding temperature outside the house. In essence, the \$\$ that were spent on keeping the place warm, were also used to allow the escaping heat to keep the outside glass pane warm. Remember the half-full glass example? Warm portion of the glass, no moisture on it! Another good example taken from life is a rear windshield of the car that has the heating element in it. Warming it up, will keep the glass free of condensation.

Let's see how energy efficient glazing in the windows works to keep our homes better insulated and warmer. A typical advanced glazing of energy efficient windows, doors or skylights has one or in some cases two surfaces covered by Low-E coatings. The primary role of Low-E coating is to keep a significant portion of the heat that would otherwise radiate to the outside world, inside the house. You can consider it as an invisible mirror that bounces the heat back. Since less heat makes it through the glass, it leaves the outside surface of the window virtually in the cold.

That of course does not mean that we will automatically encounter the condensation on the cold outside surface of the glass like we have seen it on the can of pop.

There are a few more ingredients required for the condensation to show. Perfect conditions for the moisture to settle on the cold surfaces occur after a warm, humid day and a clear, starry night with no wind. On cloudless nights, in the absence of cloud cover which act as a huge insulator, the exposed structures radiate the heat to the atmosphere and that allows them to get cooler than the ambient temperature outside. In the absence of wind this creates the same conditions that are present around the cold can of pop. The warm air can hold more water vapour than the cold air and when it encounters the colder surfaces, it gives that moisture away. Therefore, the condensation in the form of dew settles on lawns and other exposed cold surfaces like metal railings, sidings and in some cases even on windows and doors that are fitted with energy efficient glass. Of course, cars are not immune to being covered by dew. Interestingly, not all surfaces get soaking wet. Location and exposure also matters. Cars parked under the carports don't get the dew on them, windows covered by the dense trees, bushes or under the canopies will remain dew free. Did you ever wonder why frost does not form in the shadow of the coniferous trees? The shadow that these trees, bushes or other structures cast prevents the direct heat radiation path to the sky and that is where the heat likes to travel. Undeniably, the laws of physics are fully responsible for this phenomenon and laws of physics will eventually resolve the issue on its own. As the temperature gets warmer and the breeze reappears later in the morning, the moisture from the wet surfaces evaporates and the perpetual cycle of evaporation and condensation continues. So, please do not adjust your new energy efficient windows, there is most likely nothing wrong with them.

## **Condensation on the Outside of Windows**

Homeowners who have highly energy-efficient windows may notice condensation forming on the outside under certain weather conditions.

### *What is condensation?*

Condensation is the fog, water droplets or even ice that forms on surfaces when the surface temperature is too low and the humidity in the air is too high.

“Why is my bedroom window covered in moisture early in the morning? This question is often asked by homeowners who have highly energy-efficient windows. This condition usually occurs in late summer and early fall when the night time temperature drops several degrees.

The moisture on the outside of the window is condensation. It will soon evaporate when outside temperature rises. As we know, condensation happens on cold surfaces. During the night, if the outside temperature drops below the dew point then condensation forms. The fact that the condensation is forming on the windows means that very little heat from inside the house is escaping through the windows. That’s a good thing and proof that you have energy-efficient windows.

FENBC thanks Darek Jezierski, West Coast Windows for compiling this information for our association.