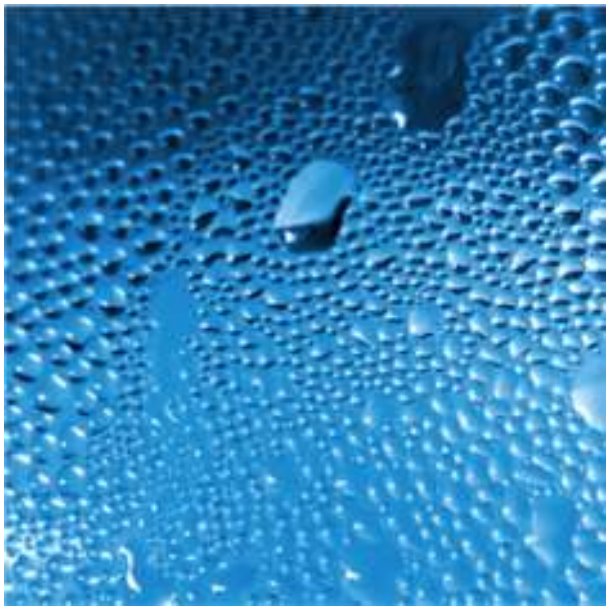
Understanding Indoor Condensation in Your Home



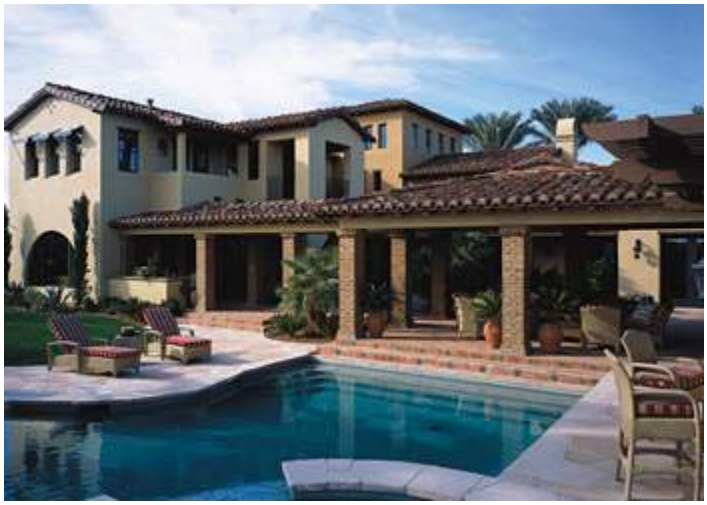
AAMA started evaluating the thermal performance of windows and doors in 1972. The first AAMA voluntary standard for thermal performance was developed specifically to measure the condensation resistance of windows and sliding glass doors. Since that time, AAMA standards have evolved to include windows and doors of various materials and types, as well as ensuring that emerging technologies are assessed.
As an association of window, door and skylight manufacturers, AAMA understands that these products enhance the beauty and comfort of your home by providing views, ventilation and daylight. To maximize the enjoyment and realization of these attributes, you should understand how condensation is formed and how it can be minimized.

Defining Condensation

Condensation is the formation of water or frost on a surface. There are several reasons that condensation forms. These include (but are not necessarily limited to) the following:

- Indoor surface temperatures of windows, doors and skylights are lower than the dew point of the surrounding air
- High indoor humidity
- Cold outdoor temperatures

You can see examples of this in your everyday life. Humidity levels increase when you shower, cook or even breathe. Another example is a cold beverage in a warm room when you can see the water droplets form on the glass. This is condensation in its simplest form.



Relative Humidity

Relative humidity is the measure of how much moisture is in the air compared to how much moisture the air can hold at a given temperature. Warmer air can hold more moisture than cooler air.

Dew Point

Dew point is the temperature at which the moisture in the air visibly forms into liquid or ice. If the surface temperature of an object falls below the dew point, water will form or “condense” on the surface of the object.

Source: https://aamanet.org/pages/understanding-indoor-condensation
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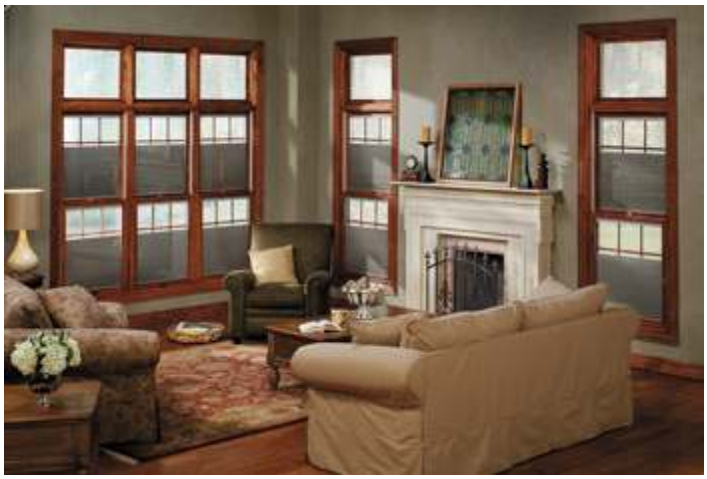
Relationship between Relative Humidity and Dew Point
At a specific indoor air temperature, when relative humidity rises, the dew point temperature will also rise. At a specific amount of moisture in the air, the relative humidity will rise as air temperature falls.

Condensation Conditions
Condensation can be expected to form on windows, doors and skylights given the right conditions. The higher the relative humidity, the warmer a surface temperature needs to be in order to avoid condensation. To reduce the likelihood of condensation, refer to the chart below for recommended maximum percentage of indoor relative humidity based upon varying outdoor air temperatures with an indoor air temperature of 70°F/20°C.

Recommended Indoor Relative Humidity		
Outdoor Air Temperature[1]	**Outdoor Air Temperature[2]**	**Indoor Relative Humidity (%RH)**
20° to 40°F	-7° to 4°C	≤ 40%
10° to 20°F	-12° to -7°C	≤ 35%
0° to 10°F	-18° to -12°C	≤ 30%
-10° to 0°F	-23° to -18°C	≤ 25%
-20° to -10°F	-29° to -23°C	≤ 20%
Below -20°F	Below -29°C	≤ 15%

[1]Home Energy Resource of Minnesota
[2]CSA A440.2 User Guide

For skylights, which reside in the higher parts of the building, exposure to condensation is more likely due to the tendency of warm air (with greater capacity to hold moisture) to rise to the ceiling.



With the increased energy efficiency and air tightness of homes, more moisture can be trapped indoors than ever before. Construction activities may create higher levels of humidity for a period of time from moisture in building materials. In extreme cases, consult an HVAC professional for appropriate options, such as whole house ventilation.

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Location Considerations
Windows in Arizona aren't often exposed to the same humidity levels and temperatures as those in Minnesota. Condensation potential varies with geographic location and altitude. Though condensation can happen anywhere, more humid or colder climates may have higher indoor condensation potential. The location within the home (such as kitchens, bathrooms and basements) can also affect condensation potential.

Reducing Condensation
The condensation in your home can be managed. As the outdoor temperature drops, lower your indoor humidity as indicated in the chart above.
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Tips to Manage Indoor Humidity Levels

- Ensure that your home is properly ventilated, especially around those areas where condensation is most likely.
- Just as you would run the defroster in your car, you should turn on ceiling fans throughout the home and run exhaust fans as needed to remove excess moisture.
- Open curtains and blinds during daylight hours. Keeping them closed increases the likelihood of condensation forming with potential moisture damage.
- Keep in mind that other items may also increase moisture levels, such as plants, aquariums or certain construction projects, including fresh paint and new masonry.
- Adjust the output of your home's humidifier (if present).
- It may be necessary to run a dehumidifier to remove unwanted moisture from the home.

Condensation Ratings
Industry standards provide a reliable method of evaluating condensation resistance in order to make valid comparisons of windows, doors and skylights.
Three known (but different) condensation rating systems are available – the AAMA Condensation Resistance Factor (CRF), the National Fenestration Rating Council (NFRC) Condensation Rating (CR) and the Canadian Standards Association (CSA) Temperature Index (I). Generally, manufacturers only obtain one of these ratings for their products. It's important to use the same rating system when comparing products (i.e., CRF versus CRF). In all three systems, higher numbers indicate better condensation resistance. Since there are many factors that can cause or control condensation, these ratings do not intend to predict actual condensation performance in a home, but are meant as resources for relative product condensation performance comparison.

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