

CONDENSATION

1. What is Condensation?

Condensation is a natural phenomenon that occurs when moisture changes from gas or vapor in the air into liquid that can appear on surfaces. Condensation is similar to the water buildup or dew that you might find on grass in the morning and can appear in many forms including a foggy mirror after a hot shower, a glass of iced tea "sweating" in the summer, your breath visible on a cold day, or water that accumulates on the interior or exterior of the glass in your home.

2. What Causes Condensation?

Condensation may occur on glass surfaces whenever there is a significant temperature differential between inside and outside air. This is because warm air can hold more moisture than cold air. For example, during cold winter months when warm, moist, interior air meets glass window and door surfaces, it is exposed to surface temperatures that may be significantly cooler due to colder outside temperatures. If the outside temperatures are cold enough to make the glass surface temperature lower than the dew point (the temperature at which air becomes saturated), the moisture can no longer be held in vapor form. The excess moisture condenses and is released in liquid form that may be visible on the glass exterior.

This same natural phenomenon can also cause condensation, and even ice, to form on glass interiors. Interior condensation results from high humidity levels inside the home. This is because warm, humid air is holding a lot of water vapor. If humid air comes into contact with cooler air that is at or equal to the dew point (the saturation limit), the moisture can no longer be held in vapor form and condensation may occur. Condensation generally appears on windows first because they are the coldest part of the house, generally in the form of water droplets or frost on the interior side of your glass. Interior condensation may also be visible on other cold surfaces like granite countertops.

The location, frequency, and extent of condensation is dependent on a variety of internal and external factors, discussed in detail below.

3. When Does Condensation Occur?

Condensation is most common during cold winter months but can occur whenever there are significant differences between inside and outside air conditions.

Other temporary conditions may also exacerbate the appearance of condensation. For example, new building materials (i.e. wood, plaster, and cement) used in new construction or remodels contain a great deal of moisture that may cause more humidity during the first few heating seasons. Drastic temperature shifts, such as sharp and quick temperature changes may also create temporary condensation.

4. Is Condensation Normal?

Exterior condensation during cold outside weather is not only normal, it demonstrates how energy-efficient the products are by reducing the flow of heat to the outdoors. However, interior condensation is an indication of excessive humidity inside the home which can cause unintended conditions.

5. Does Condensation Indicate a Glass Performance Issue?

Neither exterior nor interior condensation is caused by the glass surfaces of windows and doors and does not indicate a product performance defect or flaw. The glass simply provides a surface on which the naturally occurring liquid moisture can condense.

Condensation can even occur on some windows and not others because the location, frequency, and extent of condensation is dependent on several interrelated interior and outside conditions in addition to temperature differentials, such as internal air circulation and ventilation, room temperatures, air register location, window size, glass type, the existence and type of window coverings and screens, proximity of the window to water sources, such as plants, open fish tanks, indoor pools, hot tubs, or fountains, the direction the windows are facing, the elevation of the windows, wind direction, and sun exposure.

In fact, the only type of condensation that may indicate a glass performance issue is condensation between the two pieces of insulating glass. If you observe this condition, contact your Registered Dealer or a WWS sales representative.

6. Steps You Can Take to Reduce the Appearance of Condensation.

Although condensation is not ordinarily indicative of any glass performance issue, it should be addressed to avoid unintended consequences throughout the home. For example, if excessive humidity is causing condensation it may also be causing other conditions including a musty interior smell, water saturation, staining, or discoloration on interior surfaces, furnishings, insulation, and other building materials (including fenestration sashes and frames), blistering or peeling paint, damp spots on the ceiling or even health hazards such as mold or mildew.

To reduce the appearance of external condensation, you can take the following steps:

- raise inside temperatures;
- direct warm-air ducts toward the windows to heat the air around the glass surface, enabling it to hold more moisture;
- increase ventilation and circulation inside the home (i.e. running kitchen and bathroom exhaust fans longer and more frequently, opening the windows for a short time each day (especially after activities that cause significant steam like showering, laundry, and cooking), open interior doors, and making sure blinds, drapes, and screens are open so that the flow of warm air to the glass isn't restricted);
- remove or trim trees and shrubbery outside the home to promote air circulation;
- reduce air infiltration into the home (i.e. replace drafty windows and doors, seal cracks and replace/repair an older roof or siding).

If you are observing interior condensation, interior humidity levels should be lowered by reducing moisture sources, including:

- turning off or lowering humidifiers;
- not air-drying clothes indoors;
- properly vent appliances to the outside;
- using exhaust fans;
- closing doors and windows to high moisture areas, such as greenhouses, large aquariums, or indoor pools or hot tubs;

- using vapor barriers to prevent moisture in the soil from rising into the home;
- fixing plumbing leaks or drainage issues;
- maintaining the furnace/ensure it is working properly;
- installing an air-to-air exchanger to vent moist air outside;
- channeling water away from the home's foundation;
- ensuring the attic/crawl space are properly ventilated;
- monitoring humidity levels and run a dehumidifier as appropriate;
- storing firewood outside; and
- if you have a forced-air furnace, making sure your home is well ventilated by installing a fresh air intake.

THERMAL EXPANSION

1. What is Thermal Expansion?

Thermal expansion is a natural and temporary condition that may occur in aluminum doors when drastic temperature differentials between inside and outside air cause the aluminum to swell or shrink.

2. When Does Thermal Expansion Occur?

Thermal expansion can occur whenever ambient temperature differs greatly from one side of the door to the other. For example, where direct rays of the morning sun hit the door's surface after a cool evening or where air conditioning creates a significant difference in temperature to hot outside air.

The degree to which you'll notice thermal expansion can depend on a variety of factors including construction, length of exposure to the sun, the differential between indoor and outdoor temperatures and whether the product is thermally broken. The thermal break involves an insulating strip placed within the frame. This thermal break helps aluminum windows and doors improve thermal performance and energy efficiency because it provides a barrier between the exterior aluminum that is exposed to weather and interior aluminum that is exposed to climate controlled air. If there is a significant difference between inside and outside air, it can cause one side of the door to grow or shrink, creating the appearance of a slight bow.

3. Does Thermal Expansion Indicate a Product Performance Issue?

Temporary thermal expansion does not indicate a performance defect or flaw. Thermal expansion is a natural condition that occurs industry wide and is acknowledged and referenced in ANSI/SDI A250.8, Appendix B.

4. Steps You Can Take to Reduce the Appearance of Thermal Expansion

The appearance of thermal expansion can be reduced by:

- Sheltering a door from direct sunlight by adding a porch, awning, canopy, or trees
- Selecting lighter finishes which are least susceptible to thermal expansion
- Where appropriate, selecting non-thermally broken doors and components.