

# CONDENSATION:

## TIPS FOR COMBATING CONDENSATION

In the fall and early spring you may notice small beads of moisture on the glass of your windows and doors. In almost all instances these small beads known as condensation, are not a result of a defect in your window or door, but rather a natural occurrence that is a symptom of excessive humidity in your home. You will notice condensation on your windows and doors first, because the glass surface temperature is lower than other visible surfaces in your home such as walls and the attic.

## CAUSES OF CONDENSATION

The level of condensation in your home is effected by a mixture of gases in the air. Almost all air holds a gas commonly known as water vapor. This vapor is referred to as humidity. Humidity is moisture in the air.

Relative humidity can be figured out by taking the amount of water vapor actually in the air divided by the amount of water vapor the air can hold. Warm air can hold more water vapor than cold air. If the air is 100% saturated when the temperature drops, the colder air will need to release water vapor. The vapor that is released and seen on your windows and doors is known as condensation.

Condensation on your windows and door occurs, because the outside temperature drops, and the glass on your windows and doors is cool enough to begin cooling the air indoors. Because cooler air cannot hold as much water vapor as warm air, the saturated air inside your home releases excess water vapor once it reaches the cold glass on your window or door. The colder the temperature is outside the lower your humidity level in the house must be to reduce the potential for condensation.

The following are humidity levels recommended by the National Window & Door Manufacturers Association for houses with double-glazed windows. At these levels, window and door condensation and discomfort to residents should be minimal.

<u>Outside Air Temperature</u>	<u>Inside Relative Humidity for 70°F Indoor Air Temp.</u>
+20°F	40% Maximum
+10°F	35% Maximum
0°F	30% Maximum
-10°F	25% Maximum
-20°F	20% Maximum
-20°F or Colder	15% Maximum



## WHY SHOULD YOU CARE ABOUT CONDENSATION

Use your windows and doors as an early warning signal for potential condensation problems, because they're usually the coldest surface inside your house and usually the first place where damage occurs. Seeing condensation on the windows and doors will notify you of a problem with the humidity level in your house, before it becomes a more serious problem. If left unchecked, a condensation problem in your home may cause wood to rot, paint to peel, insulation to deteriorate, molds to grow – the floors may even buckle. Even if the moisture problem is not extensive, it can deteriorate the wood, as well as the interior finish. And, when water runs off a window or door, it can seep into, deteriorate and discolor drywall and carpeting.

### IS CONDENSATION MORE PREVALENT TODAY?

In most older homes, the insulation, weatherstripping, and other house tightening factors allowed the house to breathe and exchange drier air with more humid air.

Most newer homes are built for energy efficiency. They are sealed very well and have less ventilation than older homes. Thus drier air is not allowed to exchange with the humid air in your home, causing more humidity in your home.

#### WHERE DOES WATER VAPOR COME FROM?



One shower produces 1/2 pint of water vapor



One person's breathing produces 3 pints of water vapor per day.

Cooking and dishwashing produces 1 pint of water vapor per meal



One household plant produces 1 pint of water vapor per day.



### WHAT YOU CAN DO ABOUT CONDENSATION

Fortunately there are many possible solutions to the problem of condensation. If one solution doesn't eliminate the problem, try another – or a combination.

1. Check your window coverings. Heavy window coverings restrict the flow of warm air over the interior glass surface. Therefore, the glass remains cool and allows condensation to form.
2. If you use a humidifier in your house in the winter, keep an eye on the humidity level. When it gets higher than the recommendations noted on the previous page, turn the humidifier down or completely off.
3. Reduce indoor humidity by cracking open windows for short periods of time each day. Outdoor winter air is much drier than indoor air. Open windows to allow moist air to escape and dry air to enter – the indoor humidity level will be less.

4. Use bathroom, kitchen, and laundry room exhaust fans to vent humidity to the outdoors.
5. If there is condensation between a storm window and sash, humidity is being trapped. Simply loosen the storm window a bit to let moisture escape. (This will affect your heating cost very little.)
6. Vent all gas burners and clothes dryers to the outdoors, as water vapor is a by-product of gas combustion.
7. Raise glass surface temperatures by installing appropriate heating systems under windows and near the floor on exterior walls.
8. Install an air-to-air heat exchanger. This will exhaust stale air and bring in fresh air, while transferring heat from the stale air to the fresh air.
9. Install a wide overhang and/or rain gutters and downspouts to divert rain water away from the house foundation.
10. Replace single-pane windows with insulating glass windows or install storm windows, or both. Single pane windows are often inadequate – the glass becomes very cold in winter, allowing moisture, frost and ice to form.
11. Cover ducts and pipes with insulation that have a vapor barrier on the outside; seal joints between sections of insulation with barrier tape.
12. Insulate walls to keep their interior surfaces warm and prevent condensation. Check insulation periodically. If it settles, insulation should be added so the upper wall is protected.
13. Vent crawl spaces. Sealed crawl spaces force moisture to penetrate floors above and cause humidity problems as well as floor damage. Foundation vents in the crawl space, together with a ground cover such as polyethylene film, will prevent moisture from penetrating the floor above.
14. Insulate the ceiling. This will reduce heat loss as well as prevent condensation problems. Install the insulation at the exterior wall by extending it over the wall plate, then fastening it down. Otherwise, wind can blow under the insulation and chill the exterior part of the ceiling.
15. Vent the attic. Because condensation that forms in an attic can drip to the ceilings below, attics need proper ventilation. Check that attic louvers are not obstructed. Ventilation should be distributed uniformly along the roof, equally divided between the high ridge and low overhang. Attics need two vent openings: one to take outdoor air in and one to allow indoor air to escape. Call a heating or ventilating contractor for help in attaining the right amount of ventilation in your attic.
16. Vent exterior walls by installing miniature louvers known as *cold-side venting*. This will prevent moisture from condensing between exterior and interior walls. It is especially helpful if a home does not have an exterior vapor barrier, to ensure that water vapor that enters the wall space has a means to escape to the outdoors. One square inch of venting should be installed between each stud.

17. If building new or remodeling, consider installing a vapor barrier to the exterior wall surface. The membrane should be continuous and unbroken to prevent moisture seepage. All joints must overlap and the barrier must be fastened securely on studs, joists or bracing.
18. Grade the ground around the house for good drainage. This will help prevent moisture from entering the house.

**REMEMBER:** Make sure you keep windows and doors maintained and follow the suggestions listed in this guide to help prevent condensation from penetrating wood surfaces and causing costly damage to your windows and doors.

Should mildew that is caused from condensation on your windows and doors occur, you should remove it as soon as possible. Mildew can be removed using a solution of 10% to 20% bleach and remainder water. Scrub affected areas with a soft cloth to loosen mildew, then rinse thoroughly. Wear protective clothing, especially for eyes and hands. Wash and rinse body well after each mildew removal session.

### EXTERIOR CONDENSATION

Condensation which is located on the exterior of your windows is nothing to worry about. Exterior condensation means the windows and doors are doing their job. The more energy-efficient your windows and doors are, the more likely they are to experience this exterior condensation. The only way to reduce exterior condensation is to increase the temperature of the outer glass surface above the dew point of the air. You can try increasing the temperature inside your home or opening the blinds, shades or drapes, but you may not be able to eliminate exterior condensation completely.

### MOISTURE BETWEEN THE PANES OF GLASS

If moisture is present between the two panes of glass, there may be a problem with the seal on the unit. Contact your Kolbe supplier for information on having the unit checked for seal failure.

For more information on condensation check the following website:

[www.nwwda.org](http://www.nwwda.org)

#### References

*Undersaing Condensaion-nwwda 1997*

*Excess Moisture in Homes-1994 & Windows Condensaion-2003-University of Minn. Ext. Services*

*Winter Home Moisture Problems-University of Wisconsin Ext. Services 2003*

**AAMA/NWWDA/101/I.S.2-97 Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors**

**TABLE 4: MAXIMUM RECOMMENDED HUMIDITY LEVELS**

<b>OUTSIDE AIR TEMPERATURE</b>	<b>INSIDE RELATIVE HUMIDITY</b>
-20°F or Below	Not Over 15%
-20°F to -10	Not Over 20%
-10°F to 0	Not Over 25%
0°F to 10	Not Over 30%
10°F to 20	Not Over 35%
20°F to 40	Not Over 40%

Based on Engineering Studies at 70°F conducted at the University of Minnesota Laboratories.