

CONDENSATION

Facts and Answers

WINDOW CONDENSATION

ITS CAUSES AND CURES

What causes condensation?

The source of condensation is humidity or invisible water vapor. When this vapor comes in contact with a surface that is below what is called the dew-point temperature, the vapor become liquid. This is condensation. An example of this process takes place when someone takes a hot shower, water vapor turns to liquid on the mirrors and walls of the bathroom.

This process may also occur on windows during the winter if the inside air contains enough water vapor. During cold weather this vapor may appear as frost on the interior face of the sash.

Water vapor in the air tries to flow toward drier air and mix with it. In the winter vapor pressure is very strong because the cold, outside air holds very little moisture. The warm, moist air then tries to get to the cold air, this is called vapor pressure.

Vapor pressure has a great deal of force. It can go through wood, stone, brick, concrete and plaster. Vapor pressure cannot, however, go through glass or plastic.

Does condensation form only on windows?

NO! We notice it on windows because excessive moisture is most visible there. Far more damaging, however, is the less visible condensation that collects in walls and ceilings, as vapor pressure forces moist, inside air through wood, plaster, stone and brick in order to equalize with dry, outside air in the winter.

The Housing Research Foundation at San Antonio, Texas, states that high humidity levels greatly contribute to the deterioration of a house.

If you test the humidity in your home, be sure to use an accurate instrument, preferably a good sling psychrometer. Remember too, that these relative humidity levels are for +70 degrees Fahrenheit. For higher temperatures, a lower humidity level.

HOW DOES MOISTURE GET INTO YOUR HOME?

Possible origins of moisture in your home include: cooking, cleaning, bathing, washing clothes, breathing and perspiring.

It is possible for an average family of four to add over six gallons of moisture to the air each day. Some of these activities include:

Activity	Moisture (lb/day)
Mopping floors	2.40
Drying clothes	26.40
Washing clothes	4.30
Cooking w/electric (unvented)	2.00
Shower/Bath	2.00
Dishwashing (by hand)	1.00
Human contribution	16.80
House plants	1.00
TOTAL	55.9 lb/day 6.7 gallons/day

WHAT LEVEL OF RELATIVE HUMIDITY IS BEST FOR YOUR HOME?

As outside temperatures drop, the indoor relative humidity level of your home should be decreased. For homes equipped with at least insulating glass in their windows, the University of Minnesota Agriculture Extension Services give the following levels that can be maintained without causing window condensation.

Outside Air Temperature	Inside-Relative Humidity of 70 degrees F Indoor Air Temp
-20 degrees F	15-20 percent
-10 degrees F	20-25 percent
0 degrees F	25-30 percent
+10 degrees F	30-35 percent
+20 degrees F	35-40 percent

HOW CAN YOU CONTROL MOISTURE IN YOUR HOME?

Ventilation is the most effective means to remove moisture. By doing this, you will exchange some drier, cooler outside air for warm, humid interior air and your moisture levels will be reduced. Here are some simple solutions for reducing moisture:

- use a kitchen fan while cooking (it must be vented outdoors to reduce moisture)
- while showering, keep the bathroom door shut and have an exhaust fan running
- your clothes dryer must be vented outside, also do not hang clothes up to dry inside your home during cold weather
- shut off all humidifying devices
- if you have a fireplace, open the damper occasionally to allow moisture to escape
- allow air to circulate, do not cover hot or cold registers, leave drapes open to allow air to circulate freely over windows
- keep all rooms at a minimum of 10 degrees C (50 degrees F) even if unoccupied because condensation will occur in an unheated room
- run exhaust fans while washing floors because washing floors adds a large amount of moisture to the air
- if you do not have a fresh air intake into the cool air return duct of your heating system, have one installed and make sure that the intake damper is open and there are no obstructions to prevent air flow
- attic ventilation can be provided with inlet vents, along the eaves, and other outlet vents along the ridge and gable ends; eave vents must not be blocked by ceiling insulation and ridge vents must not be blocked by snow; warm air escapes through the ridge vents and cool air enters at the eaves

Outside Air Temperature	Inside-Relative Humidity of 70 degrees F Indoor Air Temp
-20 degrees F or below	not over 15 percent
-20 degrees F to -10	not over 20 percent
-10 degrees F to 0	not over 25 percent
0 degrees F to 10	not over 30 percent
+10 degrees F to 20	not over 35 percent
+20 degrees F to 40	not over 40 percent

10 PRACTICAL STEPS TO CONTROL CONDESATION

1. Shut off furnace humidifier and any other humidifying devices in your home
2. Basement walls and floors should be treated with efficient waterproof sealant
3. Use kitchen and bathroom exhaust fans whenever each room is being used prospectively
4. Slightly vent (open) windows in laundry room when laundering
5. Entire house may be briefly ventilated, once a day to empty humid air to the outside
6. Open fireplace damper to allow moisture to escape
7. Be sure louvers in attic or basement crawl spaces are open and that they are large enough
8. Install storm windows and be sure they are property fitted
9. If you have a bow or bay window with a condensation problem, be sure you have heavy insulation under the seat board and over the head board
10. If troublesome condensation persists, see your heating contractor about an outside air intake for your furnace; about venting of gas burning heaters and appliances; or about installation of ventilating fans

REMEMBER: Condensation on your windows does not mean there is something wrong with your windows. It is telling you, you have a much more serious problem which needs your immediate attention.

Windows do not cause condensation, they are merely indicators of condensation. If you have water on your windows, you have water in your walls.

It may take one or all of the above recommendations to cure the problem. Your heating contractor may recommend other inexpensive changes to further reduce the humidity in your home.