



## WINDOW CONDENSATION

### Causes and Cures

Each winter sees more and more homeowners vitally interested in the subject of window condensation. It's not a happy interest. It stems from bad experiences with window condensation which range from irritating to downright expensive.

It may strike you as odd, but the growing condensation problems of the nation are caused by progress.

Yes, if you have trouble with window condensation it's probably because you live in a "tight" modern home that you can heat for a fraction of the money it takes to heat the house your parents lived in — a home that's cleaner and more comfortable besides! And your condensation problems also result from widespread use of several labor saving appliances that make life easier than it used to be.

This information explains the moisture problem of the "tight" home. It offers suggestions for curing condensation problems in existing homes. It provides additional suggestions for you who are planning a home. You unquestionably will build a "tight" home, and there are more things you can do to PREVENT excessive moisture when you build than can be done in a home where the problem already exists.

#### What Causes "Trouble" Condensation?

A little fog on the lower corners of your windows now and then probably doesn't bother you. By the time you've thought about it a second time it has usually gone away.

But what we're talking about is EXCESSIVE condensation. Troublesome condensation. Condensation that blocks whole windows with fog or frost. Water that runs off windows to stain woodwork... or in serious cases even damage the wallpaper or plaster.

If you have this kind of condensation on your windows, you have good reasons to worry. And good reasons to act.

Don't worry so much about the windows... where you can SEE the effect of excess humidity. You should worry more about what excess moisture may be doing elsewhere in your home. It may be freezing in the insulation in your attic where it will melt and damage your plaster exactly like a roof leak when warm weather comes. Or it may be forcing its way out through siding to form blisters under your exterior paint. That means the most expensive kind of paint job.

It's natural and easy in such cases to blame the paint, or the insulation, or the windows. But it's wrong to blame them.

The real villain is invisible. It's water vapor... too MUCH water vapor. The best — usually the ONLY way to prevent this trouble is to get rid of excess water vapor.

Once you've equipped your home with quality insulated windows, there isn't very much more you can do window-wise to lick condensation.

#### What is Humidity?

Humidity, water vapor, moisture, steam. They're all the same. They are one form of water. Humidity is an invisible gas. It is present in varying quantities in nearly all air. THIS MOISTURE IN WET AIR TRIES TO FLOW TOWARD DRIER AIR AND MIX WITH IT.

Scientists describe this force as "vapor pressure." It is often a very powerful force indeed. It can act independently of the flow of the air which holds the moisture. Vapor pressure can force moisture easily through wood, plaster, brick, cement... right through most of the materials we use to build our homes. That is exactly what happens when moisture seeks to escape from the humid air usually found inside your home to the drier winter air outside.

#### MORE Moisture Trapped in LESS Space

Certain building materials stop water vapor. Glass is one of these. Also on this list are some varnishes, paints, tiles, plastic wall coverings. Vapor-seal insulation is designed specifically to stop the escape of water vapor and protect the insulation and your walls from the ravages of water.

Increased use of these "moisture trapping" materials in the last few years has created the modern "tight" home. Moisture created by bathrooms, kitchens, laundries and occupants no longer flows easily to the outside. The modern insulation and construction that keep cold air OUTSIDE also keep moisture in. So it is very easy to build up excessive and even harmful moisture levels in such homes. AMERICAN BUILDER magazine calls the problem a combination of many causes that build excessive moisture in the modern home.

First, more washing, more bathing, more showers, more appliances, more gas furnaces — all pour more water vapor into homes than in former years.

HEATING AND VENTILATING magazine provides builders with reference data on sources of water vapor. For instance, cooking for a family of four adds 4.5 lbs. of moisture a day to a house. Each shower contributes half a pound; a weekly laundry, 30 lbs.; human occupancy, 6 to 8 lbs. per day; dish washing 1.2 lbs.; etc.

All of this moisture MUST eventually escape from your home. So you see that the modern living of a family of four can easily release 150 pounds, or more than 18 GALLONS of water per week into the air in your home! And houses with no basements have further moisture problems.

Now, increased production of humidity is only part of the story.

Houses generally have been growing smaller and this means an even greater concentration of water vapor which is trapped by modern tight construction. It means MORE moisture contained in LESS space.

No wonder we've created a condensation problem for ourselves.

## How To Reduce Humidity

David Bareuther, Associated Press Building editor, sums up the problem of reducing humidity this way. He says there are only three ways to reduce humidity.

1. **CONTROLLING SOURCES OF HUMIDITY:** For instance, venting all gas burners, clothes dryers, etc., to the outdoors. Use of kitchen or bathroom exhaust fans.
2. **WINTER VENTILATION:** Because outside air usually contains less water vapor, it will "dilute" the humidity of inside air. This takes place automatically in older houses throughout constant infiltration of outside air.
3. **HEAT:** The process of heating your home will reduce the relative humidity — providing it's DRY HEAT. It will counterbalance most of all the moisture produced by modern living.

Now, before we summarize specific steps for reducing humidity in your home, let's include some basic data about **RECOMMENDED MOISTURE**. You can refer to it if you are inclined to test the moisture levels in your own home.

The table below is the result of long and careful experiments at the University of Minnesota's engineering laboratories. It shows the maximum safe humidities for your home... not just for the windows. Even MORE for your paint, insulation and structural members.

In most cases, reducing moisture to these humidities will cure troublesome condensation on windows. If not, you can reduce humidity further without discomfort to you or your family.

If you test humidity in your home, be sure to use an accurate instrument, preferably a good sling psychrometer. Remember, too, that these relative humidities are for 70° F. For higher temperatures, lower humidities are required.

<b>Outside Air Temperature</b>	<b>Inside Relative Humidity for 70° F. Indoor Air Temperature</b>
-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

These humidities are comfortable. They are about the average of humidities you would expect in a spring month in Phoenix, Ariz.

## 7 Practical Steps To Control Condensation

Here, arranged from easy to more difficult, are the steps you should take to reduce condensation on your windows.

1. Install replacement windows, with double or triple glazing.
2. Shut off furnace humidifier and any other humidifying devices in your home.
3. Be sure that louvers in attic or basement crawl spaces are open and that they are large enough.
4. Run kitchen or other ventilating fans longer and more often than has been your custom.

5. Open fireplace damper to allow easier escape for moisture.
6. Air out your house a few minutes each day. Air out kitchen, laundry and bathrooms during use or just following use.
7. 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.

If the commoner remedies we suggest (number 1 through 5) don't work, you REALLY have a condensation problem. But the changes your heating contractor may recommend to further reduce humidity in your home should not be very expensive. Certainly they will be less expensive than a big paint job caused by excessive vapor!

You see, the basic principle of reducing window condensation is extremely simple. When there's too much condensation on your windows, it means that humidity is too high in your home. You should take necessary steps to reduce humidity until condensation disappears.

But in practice, window condensation and reducing humidity may become very complicated, because a score or more of entirely different conditions may affect the way the condensation problem works out in different homes. Let us just mention a few.

- The number and types of windows in the home.
- The type of double glazing system on the windows.
- The heating system — hot air or water — perimeter or interior wall heating.
- The type of insulation and vapor barrier.
- Even the type of soil and quality of drainage.

Because of so many variables, a condensation problem can sometimes be very tough to solve. That's why we recommend that you put an expert to work on your problem if the simpler steps to reduce humidity don't solve your condensation problem. See your architect or heating contractor first. If they can't help, we suggest that you ask your general contractor or lumber dealer to put you in touch with a qualified expert. They are available both at engineering schools and from the staffs of heating, insulation, wallboard or window manufacturers.

Before we leave the subject of reducing humidity, we would like to add the following.

There are two causes of condensation which are **TEMPORARY**. They will disappear after a few weeks or at most a season of heating.

First, there is the moisture that comes from new construction of remodeling. There's quite a lot of moisture in the wood or the plaster or other building materials of a new home. When the heating season starts, this moisture will gradually flow out into the air in the home. Then it will disappear and not cause any more trouble.

Much the same sort of thing happens in a milder form at the beginning of each heating season. During the summer your house has absorbed some moisture. After the first few weeks of heating, your house will be dried out — and you'll have less trouble with condensation.

While we have been discussing the control of condensation we've mentioned just about everything **EXCEPT** windows. There's a good reason.

There just is nothing much that can be done with **WINDOWS** to cut down condensation. Good "economical" windows make a home more "tight".

As the building experts have often pointed out, the windows are not to blame for condensation. In the moisture content of the inside air, lies both the cause and the cure.