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Moisture Problems in the Living Area of a Home

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Today, new or remodeled homes are so tightly constructed that the air in the living area contains excessive moisture during winter. This is usually not the case with older homes because warm air leaks around the doors, windows, and other places—taking moisture with it. The best visible indication of problems is excessive moisture condensation on windows.

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What is the correct amount of moisture in the home? A relative humidity of 40 percent is about right. There will be some condensation on windows when the relative humidity of the inside air is this high.

If the air is too dry, furniture, wood floors, and other woodwork will be excessively dry. Also, some people living here may have respiratory problems.

Relative humidity tends to be low in homes during winter. This is because the capacity of air for holding moisture is doubled for each 20 degrees F. rise in temperature.

As an example, assume the outside air at 100 percent relative humidity and 0 degrees temperature enters the home and is warmed to 70 degrees. Assume also that no moisture is added to this air. When the air is warmed to 20 degrees, the relative humidity is 50 percent. When it is warmed to 40 degrees, the relative humidity is 25 percent, at 60 degrees it is 12.5 percent and at 70 degrees, it is about 9.5 percent.

Under actual conditions in the home, relative humidity does not reach these low figures because varying amounts of moisture are added to the air in the home from cooking, laundry, breathing, and other sources.

If not enough moisture is added to bring the relative humidity to around 40 percent, some should be added by means of a humidifier.

In attempting to diagnose moisture problems, first measure the relative humidity in the home to see what the actual conditions are. This is not difficult to do. A sling psychrometer can be used. This is simply two thermometers mounted together as indicated in Figure 2.

The thermometers are exactly alike except the bulb of one is equipped with a sock. Wet the sock and swing the psychrometer in a circular motion. The thermometer without the sock registers the true air temperature (dry bulb temperature), and the thermometer with the sock registers a lower temperature (wet bulb temperature). This is because of the cooling effect caused by evaporation of the water saturating the sock.

Read both thermometers, take the difference between them and refer to the table to determine the relative humidity.

For example, if the dry bulb temperature is 70 degrees and the wet bulb temperature is 56 degrees, the temperature difference is 14 degrees. By referring to the table, you'll find the relative humidity is 40 percent.

You don't have to buy a sling psychrometer to take these readings. They can be taken with only one thermometer. Attach a strong cord to it so it can be swung in a circular motion.

Take enough readings until the temperature is the same at each reading.

Then equip the thermometer with a sock which covers the thermometer bulb. Wet this sock and again swing the thermometer in a circular motion. Take readings until the temperature is the same at each reading. Figure the difference in temperature between the dry and wet bulb thermometer and refer to the table to determine the relative humidity.

If the relative humidity is consistently much below 40 percent, add moisture to the air with a humidifier. This can help you avoid drying of furniture and floors, and possibly respiratory problems.

If the relative humidity is above 40 percent to the extent that there is excessive condensation on windows, usually the best approach is to try to locate the source of the moisture, and eliminate it.

The usual moisture source in a house without a basement is the crawl space. If the soil is damp, 20 or more gallons of water per day may evaporate into the air in the crawl space in a 1,400 square foot home. This moisture will pass through the floor in the form of vapor, enter the living area of the home, and then condense on windows. (See HE-287, "Moisture Problems in Crawl Space and Basement of a Home," which covers this subject more thoroughly.)

An open gas flame adds considerable water to the air. For every gallon of fuel burned, more than a gallon of moisture is added to the air in the home. Other potential sources of moisture are:
1. Clothes dryer not vented to the outside.
2. Humidifier adding too much moisture to the air.
3. Unusual living conditions so that cooking, laundry, or other routine activities are requiring excessive use of water.

If the source of excessive moisture can be found and eliminated, this solves the problem. If none of the conditions listed are present, the house is probably so tightly constructed that there is not enough air infiltration to carry out the moisture that evaporates into the air under normal living conditions. The solution is to ventilate the house with a kitchen ventilating fan that carries excessive moisture outside.

Adding ventilation must be done with extreme care because any warm air exhausted must be replaced by cold air which must be heated. The B.T.U. per hour required to heat incoming air is about equal to the cubic feet of air per minute exhausted times the difference in temperature F. between the inside and outside air.

A 200-cfm maximum, two-speed ventilation fan would give considerable flexibility for controlling moisture by ventilation. With some practice, observing the moisture condensation and the heat bill, you can determine how often and how much to run the fan.

For serious problems that are difficult to solve, seek the services of a person trained in this field to help you work out a solution.