



Winter-Time Moisture Problems in Residences

Moisture levels inside homes in winter can sometimes be high enough to cause mildew and other problems. On the other hand, winter dryness inside some homes is also a problem. Therefore, controlling moisture levels inside a house in winter is desirable.

Winter moisture problems can usually be divided into two groups: those caused by liquid water, and those caused by moisture in the air. Other than the usual plumbing and roof-leak type liquid water problems, the most significant winter liquid water problem is an ice dam. Ice dams occur on the roof when outside temperatures are below freezing, and some precipitation has or is falling. Heat from inside the house causes snow or ice on the roof to melt and run further down the roof. Once this liquid water hits an unheated section, like an overhang, the water freezes causing a dam. Liquid water builds up behind the dam and runs back under shingles, and into the house. Quite often, an incomplete coverage of insulation or air leakage from the house causes an ice dam situation.

Other winter-time moisture problems are situations created by moisture in the air. Relative humidity (RH) is based on temperature. Warming air (without adding moisture) reduces the relative humidity, while cooling air (without removing moisture) increases relative humidity. Quite often, the coldest place in a house in the winter is a window. Condensation on a window indicates that the window is cold enough to increase the RH to 100% at the window surface. Mold on the interior of exterior walls or on ceilings around the perimeter of the house are also indications that these surfaces are cold enough to cause an increase in the RH near those surfaces. Mold may also grow on clothes and shoes in closets, where the temperature is lower than in the adjoining room.

Controlling condensation and mold growth requires either warming the surface or drying the air. In some instances, adding insulation is an option. Closets can be warmed by installing louvered doors, or by adding a heat register in the closet. Window surfaces can be warmed by adding an exterior storm window, adding a heating vent located beneath the window or by replacing the window with more a energy efficient window. Contrary to popular opinion, turning a light on in a closet does not discourage mold because of the light. Rather, the light produces heat, which in turn lowers the relative humidity, and that discourages mold.

If moisture condenses between the permanent window and the storm window, leakage of air around the permanent window is allowing warm moist air from inside the house to seep into the air space between the glass panes. In this case, an effort should be made to seal the leaking spaces. Another option is to ventilate the air space between the two windows. Do this by drilling two 3/8" diameter holes at the top and bottom of the storm window or loosen the storm window slightly.

Drying the air requires knowing the source of moisture. Crawl spaces can be a significant amount of moisture. If the crawl space soil is not covered with a ground cover, one should be added. Another major source of moisture in a house is an unvented combustion device, such as a gas fireplace or kerosene heater. Burning one gallon of kerosene produces about one gallon of water. Burning a 20,000 BTU gas fireplace for one hour produces about 1.5 pounds of water. Venting a clothes dryer inside can produce about five pounds of water per load. Other sources of moisture include people, pets, plants, cooking, cleaning, bathing and hobbies. In high moisture producing areas (kitchens, baths, and laundry), ventilation is required.

Only 4 to 6 pints of water are necessary to raise the relative humidity of a 1000 square foot house from 15% to 60%. A comfortable winter-time level would be between 30% - 50%.

At other times, or even in other locations in the house, excessive drying may occur in the winter. As outside air enters the house and is heated, the RH decreases. Wood and other materials exposed to this dry air may shrink, resulting in cracks, squeaks or gaps in floors, cabinets, doors or sheetrock. Hardwood floors may even warp as the underside dries more than the upper side.

In these overly-dry situations, the best solution is to decrease the rate of outside air entering the house. Look for leaks in ductwork, leaks around windows and doors, and through other penetration through the floors, walls and ceilings. Dampers should also be closed on fireplaces when not in use.

Contrary to popular opinion, heat pumps do not produce dryer or wetter air than furnaces or other heating systems. Often times, though, a house with ducts in the crawl space or attic may bring in more outside air that, when heated, tends to dry out the house.

The best solution to winter-time moisture problems is to create a tight house with a continuous, contiguous insulation barrier and air barrier, then control internal sources of moisture. This solution will also help alleviate or prevent summer-time moisture problems as well.