Moisture

The following article will try to make the subject of ‘moisture’ as it pertains to your house something simple to understand. The air inside and outside of our home carries a certain amount of moisture in the form of vapour. We can express moisture as ‘absolute humidity’ or the exact amount of water that is actually in the air. The air in your house may hold six large glasses of water vapour. These six large glasses of ‘water vapour’ can also be expressed as a percentage of how much water vapour the air can hold if saturated. So if the relative humidity is 60 % at six glasses, the air would be totally saturated at ten glasses.

What happens when the air is totally saturated? The air drops some of its water vapour in the form of water molecules as ‘condensation’ or even as rain. We all know that if we take a very cold can of pop out of the fridge and we let it sit on a warm day it will ‘sweat’. The air in the room may be at 60 % relative humidity but as the air around the can cools the relative humidity increases to 100 % and when the air is totally saturated it can no longer hold any more moisture as vapour and solid drops of water occur. Cooler air can not hold as much moisture as warmer air. Therefore temperature and relative humidity are very important factors whether or not ‘saturation’ or ‘condensation’ occurs. If the air is nearly saturated or close to 100 %, at any given temperature, cooling the air causes condensation.

Simply put, the greater the percentage of relative humidity, the less of a lowering in temperature will bring on condensation. Going back to our six glasses of water or 60 % relative humidity and a temperature of 21 degrees, if we dropped the temperature to about 13 degrees, condensation would occur. But if we had only 4 glass of water vapour in the air or 40 % relative humidity, our temperature could drop to around 7 degrees C before condensation would occur. This tells us that if our % of relative humidity is too high in our house and the temperature drops only a few degrees, condensation will occur on cold surfaces.

Older homes had very little problems with condensation. The homes were poorly insulated and drafty. The moisture created in the home soon travelled quickly through wall cavities, roof spaces and leaky doors and windows so that very little condensation occurred. If there was any condensation it was usually stored in the building materials and as the weather warmed during the day, the building materials could easily release the moisture through the loosely built walls and ceilings and again dry out. Our old houses were ‘healthy’ but they were not very energy efficient and often not as ‘comfortable’ as our newer homes.

Moisture in our homes comes mostly from breathing, cooking, bathing as well as from washing clothes and dishes, plants, fish tanks, damp firewood and more. Each home is unique in the number of occupants and the air tightness of the house. Some people like to sleep with windows open and some people never cook. Others have two people in a very

big house. The key is “what do we do with the amount of moisture we produce?” Excessive amounts of moisture in a house need to be removed at their source to maintain good levels of relative humidity. Humans feel best in a relative humidity of between 40 and 60 %. Indoor Air Quality and how to achieve it is discussed in an accompanying article called ‘Home Sweet Home’.

Our newer well insulated homes are starting to show some signs of too much moisture in them. Let us begin with the attics. Yes, the house is cooler in the summer and cost less to heat in the winter, but any moisture that leaks into the attic needs to go right on out the roof vents or gable vents at the peak of the roof before it has a chance to condense on the underside of the roof sheathing which is now as cold as the exterior temperature because we have insulated our ceilings so well. It is therefore important that soffits are well vented and there is plenty of venting at the peak of the roof. A wood shake roof has more ‘breathability’ than an asphalt shingle roof on plywood sheathing. The underside of roof sheathing should be checked once a year for any possible condensation and mould.

Going back to the cold temperature of the pop can and its ‘sweating’ we can now understand that there may be some ‘sweating’ inside the exterior walls of our houses. We have placed ‘air barriers’ behind our drywall to keep the moisture inside the house from going into the wall cavity. The invisible could happen that as our house cools at night, the temperature in the wall could drop to a temperature where condensation could occur. Fortunately, the next day the wall would again warm and the condensation would disappear. It is important however that we keep external water such as rain from entering the wall cavity and creating a higher than normal relative humidity level.

The following clues may indicate excess moisture levels in our home that may need some investigation or monitoring: 1) Condensation on double pane windows, 2) Staining or mould, often in bathrooms or on window frames and on cold walls (especially in basements in the ground), 3) Stuffy air, and 4) Odours that linger in the house--cloth materials become too damp and hold in odours.

In summary, wood itself needs to stay dry to prevent decay. Germination of mould spores needs a relative humidity in excess of 90 % but growth can continue as low as 70 %. We know that condensation occurs when warm moist air meets a cold surface. The risk of condensation therefore depends on how moist the air is and how cold the surfaces of a room are. Condensation may occur for short periods of time in bathrooms and kitchens because of the steamy atmosphere and for longer periods of time in unheated bedrooms and basements or in corners of rooms where ventilation and movement of air are restricted. It is therefore important to remove very moist air to the outside and to provide adequate heating and/or air circulation to all parts of the house.

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