Don't Sweat The Small Stuff:

A look at the "big picture" of moisture problems

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Misapplications of the Codes

Some people falsely believe the Building Code and/or Energy Codes are causing homes to rot and develop excessive moisture conditions. This is simply not true. You have to understand that by building a home to the minimum standards of the Building & Energy Codes, you are CONSTRUCTING THE WORST HOME YOU ARE LEGALLY ALLOWED TO BUILD. The codes are designed and constructed to solve an average situation or problem, not to be a blueprint for all instances. The Building & Energy Codes now are often used as a design parameter for situations they were never intended to address. New codes are intended to help save energy, but we should not rely on an energy code that is designed to conserve resources to solve problems related to water intrusion or condensation.

"…we should not rely on an energy code that is designed to conserve resources to solve problems related to water intrusion

Basements are still being designed today in much the same way they have been for the past 100 years. The difference in today's basement is that that we are now finishing them to a level similar to the upper floors. In the past, basements were used primarily for a root cellar or storm shelter. They later became a place for mechanical equipment, and now basements are used as an extension of our living space. The demand for a comfortable and waterproof basement is becoming more difficult especially considering that many building sites are less than ideal to begin with.

Why waterproofing isn't enough

Properly designed wood foundation systems have seen successful use in basements due to their inherent designed use of waterproofing and extensive drainage systems. In attempting to overcome the moisture issues seen in masonry systems, there must be the same increased usage of waterproofing, insulation and drainage to achieve success. In the case of a block basement with an interior standard frame insulated wall, many builders fail to install an effective air barrier to prevent air movement in the wall assembly. Essentially, in conjunction with standard masonry or concrete walls, this is just a wood foundation composite assembly without treated lumber and without required drainage and waterproofing. Either system will fail if air movement allows condensation within the assembly.

Condensation & dew point: The key to understanding moisture

A properly designed basement or crawl space should not have to rely on a dehumidifier to keep it free of moisture. The key to a dry basement is providing insulation that allows materials that come into contact with air to remain above the general dew point

temperature. You do not need a psychometric chart to understand and calculate this temperature. Climate conditions within a given area provide all the data you need. A lot of complicated explanations and formulas have been devised to explain the dew point problem and issues related to air transfer of moisture. Some people have relied on ventilation to solve the issue, but have failed. Ventilation is NOT the answer for a dew point problem.

While ventilation in codes is generally designed to keep a space cool or warm, they are not meant to control all moisture problems. If you understand that air compresses when cooled and expands when hot, you will understand what happens when you introduce water in a vapor form into air. Water does not compress or expand (relatively), so if you cool (compress) humid air, you will increase the humidity level of that air. If you take cold humid air and heat (expand) it the humidity level will drop. This is why beer cans sweat in the summer and eyeglasses do not frost up when leaving a warm home, but do when you come in from the cold. Go driving in a hot humid climate and turn on your defrost and AC and watch your window sweat on the **OUTSIDE** in the moving air stream. You will also notice this is occurring where there is more than adequate ventilation.

How does moisture get into a home?

The problem in understanding the difference between a roof vs. a basement/crawlspace issue is that a roof is generally ventilated with warmer air alleviating most moisture issues in the quickly warmed space. Moisture problems sometimes occur in a northern climate when there is a heavy cover of snow remaining on a roof and warm humid spring air is introduced into the cool attic. This however is generally short lived due to the rapid snowmelt.

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As an enclosed space, the home must control its own environmental conditions. Consider the example of a solar still in the desert. A solar still is basically a hole in the ground, which is covered in plastic. When the sun shines on the still, water is condensed from the moisture source onto the plastic. As a result of our building methods today, the interior home environment can act in a similar manner.

So, where do we go from here?

Basement slab insulation has long been overlooked as a solution to providing a dry, comfortable living space. Rather than insulation we seem to prefer to rely on AC or dehumidification to control moisture. Most people who have in-floor heat in their basements enjoy its benefits whether or not the heat is on. Why? The concrete floor has a layer of insulation, which keeps the concrete closer to the room temperature and acts as a moisture barrier. In Minnesota, if the concrete is between 68 to 70 degrees F, condensation moisture does not seem to be a problem. Plus, in-floor heat is comfortable. If we have R-5 to R-10 insulation under a slab and R-10 + continuous insulation on the foundation, we have seen good results for a well-drained dry site.

Because of the housing demand, most well drained sites have already been built upon, and a good percentage of new homes are now constructed in wet, low-lying areas. It is not surprising that these homes are having problems we have not seen before. If builders adopt a pro-active approach towards moisture control, homebuyers can be "sold" on the benefits making it a win-win solution.

Preventive measures for building a moisture-free home include:

- √ **Provide drainage and waterproofing** so that homes are constructed on dry, well-drained site to begin with.

- √ **Ventilate homes to provide a healthy living environment**, but not in an attempt to control overall moisture problems. Take care of these problems at the sources.

- √ **Treat the walls as you would a vertical roof**. Think about rain on a wall the same as you do on a roof: Wind can blow rain sideways and drive excessive amounts of water onto a wall.

- √ **Insulate sufficiently** and in a manner that will keep airborne moisture from contacting materials below problem dew point temperatures.

Summary

The final test for a home is: does it require a basement dehumidifier or AC system to control moisture? Those in the building industry should be thinking of the long-term energy usage and costs of these systems. If homeowners were educated on the true source of moisture problems, would you be able to provide a workable solution?

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Note: The opinions in this paper are those of the author and are designed to promote thinking about moisture problems in a systems-based method. Even the best-engineered system can be destroyed by a non-informed operator, so the author believes that passive control with limited operator intervention is the best approach.