

## A FEW FACTS ABOUT WOOD AND ITS WATER ABSORPTION



Have you ever wondered why old wooden buildings, decades old, are still standing, yet the substructure of your house is decaying?

First of all, crawl spaces are a 50 to 60 year old invention! Prior to 1930 almost all private homes without basements were built on open foundation blocks or on a slab of concrete. However, once home building became an art form, the appearance of the home became more important and the open spaces were enclosed. That's when the problems started. Where we built our homes and site selection had more to do with available subdivisions than the type of soil.

The substructure of homes with crawl spaces restrict natural air circulation. Before the addition of crawl spaces, buildings had a chance to dry out during the Spring, Fall and even the Winter. Wood decay can be prevented if the **wood gets a chance to dry out** as quickly as possible, even if it has absorbed a high amount of moisture.

"Wood and other hygroscopic materials change dimensions with variations in **moisture content (MC)**. The MC of wood varies with the **relative humidity (RH)** and temperature of its ambient air."

"Wood MC is expressed as a percentage of its oven dry weight. The average fiber saturation point for most species is about 30%. The average **equilibrium moisture content (EMC)** at 68 degrees F and 45% RH (heating season indoor conditions) is about 8.5%. At 70 degrees F and 70% RH (summer conditions), the EMC is about 13%."



"Wood decay is a warm weather phenomenon, most active at temperature between 50 and 100 degrees F and essentially inactive when the temperature drops below 35 degrees F.



New repairs were needed after only three years of neglect.

During the first repair (1993) no improvements were made to the ventilation system.

High humidity and a lack of air circulation "restarted" the decay on all the newly replaced joists.

The required wood MC to sustain decay has been estimated at over 20%. Once established, decay fungi produces 0.55 lb of water for every pound of cellulose decomposed. **For a sufficient safety margin, the MC should remain at 20% or less."**

"Mold can grow on surfaces of dry wood (below 20% MC) at relative humidity above 85%. Condensation on a wood surface is an important moisture source for the [fungi](#)."

The above information was collected from the 1993 ASHRAE Handbook FUNDAMENTALS 20.13 *Water in Building Materials* and below from the WOOD HANDBOOK (FPL 1974).

Matrix for relation of **wood moisture**, humidity, and temperature. These are equilibriums, which need some time to establish themselves:

Relative Humidity (%)				F
80%	85%	90%	95%	
16.4	18.4	20.9	24.3	
16.2	18.2	20.7	24.1	
16.0	17.9	20.5	23.9	
15.7	17.7	20.2	23.6	
15.4	17.3	19.8	23.3	
				50
				60
				70
				80
				90

Unfortunately the humidity in a crawl space during the summer time can easily be 90% at all times. That can generate wood moisture readings in the 20's. Higher readings point to serious problems (or a faulty instrument)!

Note: Engineered wood always reads 2-3% higher than grown timber. The reason is the glue used.

May 26, 2007

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