

How Moisture and Humidity Affect Installation of Wood Floors



by Grete Heimerdinger

Moisture problems in wood floors can be caused by many different factors. Interaction between wood and air is one of those factors. Wood is a hygroscopic material, which absorbs or loses moisture until equilibrium with the surrounding air has been reached. When the moisture content changes, shrinking, cupping or crowning can occur.

How relative humidity affects wood

The relationship between wood moisture, air humidity and air temperature determines what wood will do; expand, shrink or keep its moisture. Wood is stable when no more changes occur; it has reached the equilibrium moisture content.

Check the graph on the following page for the stable wood moisture for any given relative humidity and temperature. The graph can also tell you what the relative humidity should be to keep wood stable at a certain moisture content.

Equilibrium moisture contents and the corresponding relative humidity and temperature values can also be found on the Internet at <EMC Calculator>.

Since ambient conditions inside heated homes or offices usually range between 30 to 50% at a temperature of 60 to 80 degrees Fahrenheit;

the recommended wood moisture percentage for flooring is 6 to 9%. See the highlighted area in the graph on the next page. Within these recommended values, expansion and contraction are limited.

For example: When a dry floor with the perfect moisture content of 6.2% is exposed for a long time to air with a relative humidity of 60%, the wood will absorb moisture and expand until 11% has been reached. Depending

on wood species, the 5% change in moisture content can be accompanied by a substantial amount of expansion.

Floor installers have to deal with different relative humidity conditions depending on when and where the installation takes place. Average relative humidity differs between coastal areas and high desert and between summer and winter. This is the main reason why acclimation is an important step when installing hardwood floors.



About the Author

Grete Heimerdinger, born in Stuttgart Germany, was a teacher before moving to the United States in 1975. She has been Vice-President of Lignomat USA for the past 30 years. She has been actively involved with the development of all new products and has been the author of Lignomat's publications related to moisture issues. For more information, visit Lignomat's new web site: www.moisture-problems.info.

Relative Humidity

Temp	15	20	25	30	35	40	45	50	55	60	65	70	75
40	3.7	4.6	5.5	6.3	7.1	7.8	8.7	9.5	10.4	11.3	12.4	13.5	14.9
50	3.6	4.6	5.5	6.3	7.1	7.9	8.7	9.5	10.3	11.2	12.3	13.4	14.8
60	3.6	4.6	5.4	6.2	7.0	7.8	8.6	9.4	10.2	11.1	12.1	13.3	14.6
70	3.5	4.5	5.4	6.2	6.9	7.7	8.5	9.2	10.1	11.0	12.0	13.1	14.4
80	3.5	4.5	5.4	6.2	6.9	7.7	8.5	9.2	10.1	11.0	12.0	13.1	14.4
90	3.4	4.3	5.1	5.9	6.7	7.4	8.1	8.9	9.7	10.5	11.5	12.6	13.9
100	3.3	4.2	5.0	5.8	6.5	7.2	7.9	8.7	9.5	10.3	11.2	12.3	13.6

The Floor Installer's Responsibility

Floors don't cup, crown or get out of alignment unless the wood moisture changes. It is the floor installer's responsibility to make sure that upon completion of the installation the moisture of the wood floor is in equilibrium with the surrounding air.

Step 1: Accepting the floor. Once the floor is delivered, the moisture content should be confirmed. The supplier should be contacted promptly if the moisture content is not within specifications. See **Photo 1**.

Step 2: Acclimation to service conditions. Acclimation is recommended to allow the wood to adapt to the specific relative humidity conditions where the floor will be installed. This is only beneficial if the ambient condition during the acclimation period is the same as when the room is in use.

Use a thermo-hygrometer to measure the ambient conditions, or better yet a relative humidity data logger, which can keep track of the relative humidity and temperature during acclimation. With the data logger you can actually see if the homeowner "accidentally" turned off the heat, while you are trying to acclimate the floor.

The acclimation time varies for different wood species. However, all wood species will acclimate under the same relative humidity and temperature to the same moisture content.

Step 3: Final moisture check after the installation is completed. The purpose of final moisture readings is to document the moisture condition of the floor at the time the new owner signs off on the completion of the job.

Select moisture-critical places and obtain moisture readings. At this time a pinless meter is recommended, because it leaves no pin holes. Dual-depth, pin less meters have been developed to pin-point the moisture distribution within the floor planks more precisely.

Note date, make of meter, wood species settings, measuring depth, location and moisture values. Take a photo for future reference. **Photo 3** shows the moisture value, the wood species setting, the measuring depth and the location where the photo

was taken (corner by the window).

In case you have to go back to check out a problem, you can easily take another series of readings in the same locations and compare to the original values. This allows for a better diagnosis of any problem.

Step 4: Customer instructions and warranties. Customers should be made aware that the ambient conditions in their homes or offices affect the moisture in wood floors. Unless

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Photo 2



Photo 3



a HVAC is operated year round, the most unavoidable change in relative humidity comes from the climate outside. During dry winter months, small cracks may appear in a wood floor, which disappear in the wetter summer months.

Warranties for floors over extended periods of time should always be connected with keeping ambient conditions within a certain range.

Since floors do not react to a swift breeze but to persistent high and low relative humidity conditions, data loggers can be used to easily keep track of ambient conditions during the warranty period.

Why Record Keeping is Important

In case of floor failure, the question

always comes up, who is to blame and who pays for any necessary repairs. The problem may be very obvious but the cause for the problem is often hard to find. It could be: The contractor not checking whether the concrete slab is dry; the floor supplier delivering floor planks with a high moisture content; the floor installer not noticing the high moisture content and installing the floor anyway; the floor installer using a subfloor with too much moisture. And last, the home owner turning off the air condition.

Keeping reliable records can help protect the installer from unwarranted claims. The interaction between moisture content and relative humidity can make the difference between a long-lasting, beautiful floor or an unhappy customer with an expensive claim. **FCI**