

EFFECTS OF HUMIDITY ON WOOD



Effects of Humidity on Wood

Wood is characteristically a fibrous resource material with a natural design that allows it to perform in a wet environment, absorbing and losing moisture with changes in the humidity of surrounding air to balance its moisture content. All wood is **hygroscopic**, meaning that when exposed to the elements, it will expand as it gains moisture and will shrink when it loses moisture. Wood also does not shrink or swell equally in all directions. **Moisture Content** of wood affects its structural properties such as weight, dimensions and strength. Any solid wood or wood component will expand or contract over time with changing moisture and climate conditions and this exchange of moisture is ongoing. In an uncontrolled environment, wood is a dimensionally unstable material. Some wood species are more hygroscopic than others and the expansion and contraction is more pronounced. Softwoods shrink and swell less than hardwoods when the Moisture Content changes. We make assumptions that because furniture or cabinetry is “finished” with toners, stains, sealers, and topcoats that it is impervious to moisture. Although finishes will inhibit and limit the absorption of moisture, they will not keep it from occurring. Similar to how a wood table will absorb the water from the condensation on a drinking glass or a spill, wood will absorb moisture from the air itself, or through direct contact of a liquid. Furthermore, the Moisture Content of wood is directly related to the humidity and ambient temperature of its immediate surroundings.

Humid Climates

Wood-based products in humid climates are especially susceptible to expansion and swelling due to the extra moisture in the air. If wood products are exposed to excessive moisture for an extended period of time, they may not revert to their original size. The key to controlling expansion and contraction, and moisture levels in the wood is through humidity control. A common issue experienced with wooden cabinet doors is when they start to rub together and/or become misaligned. A minimum moisture content between 22 to 24 percent in the wood

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will cause decay to spread and possibly cause further damage. For untreated wood in the household, building experts recommend 19 percent as the maximum safe moisture content in the wood. **NOTE:** Water by itself does not harm the wood, but rather, if there is consistent high moisture content, fungal organisms will happily grow.

Dry Climates

In low humidity conditions, wood will give off/release moisture and contract or shrink in size. During the winter months and in generally colder environments, cabinet shrinkage occurs from the dry heat produced by the home's heating system. As the wood loses moisture, gaps and possible cracks will appear at the joints between the various pieces. As this natural movement occurs, painted doors will also reveal seams at the joints, and any unfinished lines may appear around door panels. When the cabinetry regains its lost moisture under produced humidification or during the summer months, these gaps will often close and be less noticeable. This occurs with all wood products such as Kitchen Cabinetry, Millwork or Furniture, and may occur in any environment.

Recommended Humidity Levels and Moisture Control

Within the wood working industry you will often see a variety of suggested humidity ranges for your home from different types of manufacturers producing a variety of wood products. Often ranges of 25-55 percent, 30-60 percent, and 35-65 percent are suggested. There is no magic number for humidity levels in any one home or dwelling as each location is unique in its construction and design. Construction methods and designs are loosely based on its external environment as there are different forms of insulating, ventilating, heating and cooling; all of which have an effect on the interior environment. The ranges provided are the recommended specification by any manufacturer of wood products. The recommended temperature would be approximately 21-22°C or 70°F with a corresponding humidity level of approximately 35 percent – 55 percent.

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The main objective when addressing moisture content in wood is to keep it from entering the home and to balance the moisture content within the building itself. Moisture control by means of accepted design and construction detail is a simple way of protecting the wood against the effects of moisture. In applications where there is a high probability of the wood staying wet due to moisture, designers should select materials that are more naturally resistant to fluctuations in humidity such as the use of softwood rather than hardwood. Softwoods are less affected by changes in moisture content due to fluctuations in humidity within the home.

As the relative humidity increases, so will the moisture content of wood products and they will expand. The opposite is also true in which, when the relative humidity goes down, so will the moisture content causing the wood products to contract or shrink. Natural expansion and contraction of hardwoods will at times be visible on painted finishes. This natural characteristic is to be expected in a normal home throughout the year, even with climate control and is not considered defective. The higher the relative humidity is allowed to go beyond the recommended 55 percent, the more the wood products will expand and may fail at extreme moisture content levels. Failure possibilities include but are not limited to: splits, doors rubbing together or against the frame of the cabinet, cracks at laminated wood joints, wood joint expansion as well as separation of joints due to inset floating panel expansion. Low relative humidity levels will cause the wood to shrink. Some failure possibilities include but are not limited to: cracking, joints opening, raw wood lines exposed around floating center panels.

Expansion and contraction of wood components due to moisture content fluctuation caused by humidity is a natural occurrence and is not considered a defect in material or workmanship. Moisture related issues can be minimized by maintaining a steady relative humidity in the home environment.

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How to Avoid Moisture Content Issues with Your Cabinetry

- Monitor Temperature and Humidity with a simple electronic Thermo-Hygrometer.
- Proper climate control within the home can greatly reduce the occurrence of moisture-related problems.
- Keep in mind that cabinetry in non-air conditioned or humidity-controlled homes in areas of high humidity will expand.
- Homes that are not occupied should always be maintained with some type of climate control.