

Protecting Wood From Humidity

Indoors or out, wood is affected by moisture. Wood swells when it gets wet and shrinks as it dries, whether the moisture is liquid water (like rain or dew) or water vapor in the form of high humidity. However, wood coated with the proper finishes will be affected less than wood left unfinished.

Tests conducted at the Forest Products Laboratory (FPL) on the moisture-excluding effectiveness of finishes on wood surfaces show that no one coating applied on wood entirely prevents moisture uptake in high humidity or drying in low humidity. Researchers did find that the moisture-excluding effectiveness of wood finishes varied greatly. Some were very good to excellent, some were poor, and many were in-between. The most effective approach was when three coats of finish were applied to the wood surface.

Moisture-excluding effectiveness (MEE) of wood finishes (three coats after 14 days at 90% relative humidity).

Finish	MEE ^a
Melted paraffin wax (one coat, dipped)	95
Two-component epoxy/polyamide gloss paint	87
Aluminum-pigmented polyurethane gloss varnish	84
Soya-tung satin enamel	80
Pigmented flat shellac	73
Two-component polyurethane wood sealer	63
Orange or white shellac	46
Phenolic/tung floor sealer	35
Paste wax	1
Linseed oil	0

^aWood finishes vary in their effectiveness at excluding moisture. Higher numbers indicate greater effectiveness. Paraffin wax and epoxy paint are very effective; paste wax and linseed oil perform very poorly.

Several factors determine how effective a finish will be in controlling moisture. One is film thickness. Generally the more coats applied, the slower the moisture changes and the greater the protection. A second factor is the type of finish used. Pigmented coatings, such as oil-based paints, are

usually more effective in retarding moisture changes than clear coatings, such as varnishes and shellacs. A third factor is time. Even good coatings lose their effectiveness over time. The longer the exposure, the lower the effectiveness. Finally, finishes will protect wood from moisture only when applied evenly to all wood surfaces. Unequal coatings on the surfaces of a wood piece may cause unequal shrinkage and lead to warp.

Controlling moisture is very important in using wood indoors and outdoors. The information developed on moisture exclusion should be helpful in determining which finish should be used for a particular need. This information is particularly valuable to furniture finishers or anyone wishing to protect wood from temporary high or low humidity.

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References

Feist, W.C.; Peterson, G. 1987. Protecting wood from humidity. *Fine Woodworking*. 64(May/June): 59-61.

Feist, W.C.; Little, J.K.; Wennesheimer, J.M. 1985. The moisture-excluding effectiveness of finishes on wood surfaces. Res. Pap. FPL-RP-462. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory.

Feist, W.C.; Little, J.K.; Wennesheimer, J.M. 1985. The moisture-excluding effectiveness of finishes on wood surfaces--support data. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 23 p. (Available from the National Technical Information Service (NTIS), U.S. Department of Commerce, 5285 Port Royal Rd., Springfield, VA 22161. Document Order No.: PB86-147717; Cost: \$12.50 plus \$4 S&H).

