

TECHNICAL NOTE NUMBER F-13

FOREST PRODUCTS LABORATORY - U. S. FOREST SERVICE - MADISON, WISCONSIN

MOISTURE CONTENT OF WOOD AT DIFFERENT HUMIDITIES

Wood kept for any length of time in one locality or under fixed atmospheric conditions tends to come to a definite moisture content, the percentage being dependent upon the humidity conditions prevailing. For instance, lumber placed out of doors but protected from rain and snow in the northern states eventually retains about 12 per cent moisture; at certain places in the arid Southwest or in heated buildings it retains only 4 to 6 per cent moisture.

Since any absorption or loss of moisture in seasoned wood causes swelling or shrinking, wood should be brought to nearly the proper moisture content before being manufactured into delicate parts or put in any service where the retention of exact shape is important.

The amounts of moisture retained by wood at ordinary temperatures and different humidities are given in the accompanying table. These results were obtained in tests at the Forest Products Laboratory on thin specimens of seven different woods. It will be noted that only slight differences are shown between the moisture-retaining qualities of the several woods tested, and the average values given should, therefore, be roughly applicable for all woods. Further tests on larger pieces of wood indicate that a variation of about 1 per cent or less may be expected in the same species. These results accurately check the data given in the table between 20 and 70 per cent humidity. Above 70 per cent values on larger blocks appear to be somewhat lower than given in the table. At 100 per cent humidity wood takes on moisture until saturated.

The data should find application in drying lumber and in controlling the humidity in workrooms and con-

ditioning chambers to bring stock to the proper moisture content for any given use, where the atmospheric conditions are known. An example may be cited in the conditioning of airplane propeller stock for use in Army and Navy machines. The object was to establish moisture conditions in the propeller in equilibrium with those most likely to be met in service. The tendency of the propeller to absorb or give off moisture, and consequently to warp and lose its balance, was thus reduced to the minimum.

In seasoning lumber it is usually best to dry it until its moisture content approaches more nearly the minimum it will have in use than the maximum, because swelling usually is not so detrimental as shrinkage.

MOISTURE CONTENT OF WOOD AT VARIOUS ATMOSPHERIC HUMIDITIES (In percentage of oven-dry weight of wood)

Relative humidity of atmosphere (per cent)	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
Moisture content of:																
White oak -----	4.5	5.3	6.2	7.0	7.8	8.7	9.5	10.4	11.3	12.6	14.0	15.8	17.5	20.0	23.0	26.5
Black walnut -----	4.8	5.4	6.2	7.0	7.8	8.6	9.4	10.3	11.2	12.3	13.5	14.9	16.7	18.7	21.3	24.4
Sitka spruce -----	4.2	5.1	6.0	6.7	7.4	8.1	8.8	9.7	10.5	11.7	12.9	14.3	16.2	18.3	21.0	24.3
Yellow birch -----	4.2	5.0	5.7	6.5	7.4	8.3	9.2	10.2	11.3	12.4	13.7	15.2	17.0	19.4	22.3	26.0
Ash -----	4.3	5.1	6.0	6.7	7.7	8.7	9.7	10.7	11.9	13.2	14.6	16.5	18.0	20.5	23.8	28.0
"African mahogany" -----	5.6	6.5	7.5	8.4	9.3	10.3	11.2	12.2	13.2	14.2	15.3	16.5	18.0	19.7	22.2	25.2
Southern yellow pine, 2.4% resin -----	5.7	6.4	7.3	8.2	9.0	9.9	10.8	11.8	12.7	14.1	15.5	17.0	18.5	20.2	22.5	26.0
Southern yellow pine, 25% resin -----	6.7	7.3	8.0	8.8	9.6	10.4	11.2	12.0	12.9	14.0	15.2	16.5	18.3	20.4	22.9	26.5
Average -----	5.0	5.8	6.6	7.4	8.2	9.1	10.0	10.9	11.9	13.0	14.3	15.7	17.5	19.5	22.2	25.6