Computing Moisture Content of Wood

Collected From: http://www.woodbin.com/ref/wood/emc.htm

The moisture content of wood is directly related to the humidity and temperature of the surrounding air. The equilibrium moisture content (EMC) occurs when the wood has reached an equilibrium with its environment and is no longer gaining or losing moisture. Here is a calculator for computing the EMC of wood at or below the fiber saturation point (about 30% moisture content) given the temperature and relative humidity:

The table below provides EMC values for a fairly representative range of atmospheric conditions that wood is likely to be exposed to. Values in this table are applicable to wood of any species for most practical purposes.

Relative Humidity %	**Ambient Air Temperature - degrees Celsius and Fahrenheit** (Celsius rounded to nearest degree)										
C:	**−1**	**4**	**10**	**16**	**21**	**27**	**32**	**38**	**43**	**49**	**54**
F:	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**
5	1.4	1.4	1.4	1.3	1.3	1.3	1.2	1.2	1.1	1.1	1.0
10	2.6	2.6	2.6	2.5	2.5	2.4	2.3	2.3	2.2	2.1	2.0
15	3.7	3.7	3.6	3.6	3.5	3.5	3.4	3.3	3.2	3.0	2.9
20	4.6	4.6	4.6	4.6	4.5	4.4	4.3	4.2	3.0	3.9	3.7
25	5.5	5.5	5.5	5.4	5.4	5.3	5.1	5.0	4.9	4.7	4.5
30	6.3	6.3	6.3	6.2	6.2	6.1	5.9	5.8	5.6	5.4	5.2
35	7.1	7.1	7.1	7.0	6.9	6.8	6.7	6.5	6.3	6.1	5.9
40	7.9	7.9	7.9	7.8	7.7	7.6	7.4	7.2	7.0	6.8	6.6
45	8.7	8.7	8.7	8.6	8.5	8.3	8.1	7.9	7.7	7.5	7.2
50	9.5	9.5	9.5	9.4	9.2	9.1	8.9	8.7	8.4	8.2	7.9
55	10.4	10.4	10.3	10.2	10.1	9.9	9.7	9.5	9.2	8.9	8.7
60	11.3	11.3	11.2	11.1	11.0	10.8	10.5	10.3	10.0	9.7	9.4
65	12.4	12.3	12.3	12.1	12.0	11.7	11.5	11.2	11.0	10.6	10.3
70	13.5	13.5	13.4	13.3	13.1	12.9	12.6	12.3	12.0	11.7	11.3
75	14.9	14.9	14.8	14.6	14.4	14.2	13.9	13.6	13.2	12.9	12.5
80	16.5	16.5	16.4	16.2	16.0	15.7	15.4	15.1	14.7	14.4	14.0
85	18.5	18.5	18.4	18.2	17.9	17.7	17.3	17.0	16.6	16.2	15.8
90	21.0	21.0	20.9	20.7	20.5	20.2	19.8	19.5	19.1	18.6	18.2
95	24.3	24.3	24.3	24.1	23.9	23.6	23.3	22.9	22.4	22.0	21.5
98	26.9	26.9	26.9	26.8	26.6	26.3	26.0	25.6	25.2	24.7	24.2

EMC Equation

The EMC calculator and table employ the following equation to derive moisture content:

$M = 1800/W [KH/(1-KH) + (K_1KH + 2K_1K_2K^2H^2) / (1 + K_1KH + K_1K_2K^2H^2)]$

Rewrote to be:

$$EMC = \frac{1800}{W} * \left(\frac{K * H}{1 - K * H} + \frac{K_1 * K * H + 2 * K_1 * K_2 * K^2 * H^2}{1 + K_1 * K * H + K_1 * K_2 * K^2 * H^2} \right)$$

where

M (EMC) = moisture content (%)
T = temperature (^oF)
H = relative humidity/100

$W = 330 + 0.452T + 0.00415T^2$
$K = 0.791 + 0.000463T - 0.000000844T^2$
$K_1 = 6.34 + 0.000775T - 0.0000935T^2$
$K_2 = 1.09 + 0.0284T - 0.0000904T^2$

Source: U.S. Forest Products Laboratory