

# 1-hour timelag dead fuel moisture model

## Description

The 1-hour timelag fuel moisture  $MC_1$  is the moisture content of the 1-hour timelag fuels, which consist of fine dead fuels, i.e. dead herbaceous plants, roundwood less than 0.25 inch in diameter, and the uppermost layer of litter on the forest floor (Deeming et al. 1977).

The calculation of the 1-hour timelag fuel moisture model requires the use of fuel sticks. However, an estimation of the 1-hour fuel moisture at midafternoon without the use of fuel sticks is possible according to the formula described here (Bradshaw et al. 1983).

The calculation of the 1-hour timelag fuel moisture model requires daily temperature [°F], relative humidity [%] and fraction of sky cover at early to midafternoon time (Bradshaw et al. 1983).

## Formula

This type of fuels responds so quickly to changing environmental conditions that only the equilibrium moisture content  $EMC_{f/a}$  at the fuel-atmosphere interface is required for calculating the 1-hour timelag fuel moisture (Cohen & Deeming 1985).

The equilibrium moisture content [%] at the fuel-atmosphere interface  $EMC_{f/a}$  is a function of air temperature  $T_{f/a}$  [°F] and relative humidity  $H_{f/a}$  [%] in immediate contact with the fuel elements.  $T_{f/a}$  and  $H_{f/a}$  are estimated by correcting air temperature  $T$  and relative humidity  $H$  at instrument height (4.5 ft) according to cloud cover. The temperature correction has to be added to  $T$  in order to obtain  $T_{f/a}$ , and the relative humidity correction has to be multiplied by  $H$  in order to obtain  $H_{f/a}$  according to the following adjustment factors (Bradshaw et al. 1983):

Variable	Fraction of sky cover			
	0.0-0.1	0.1-0.5	0.6-0.9	0.9-1.0
Temperature [°F]	+ 25	+ 19	+ 12	+ 5
Relative humidity [%]	· 0.75	· 0.83	· 0.91	· 1.00

Then,  $EMC_{f/a}$  is obtained by substituting  $T$  and  $H$  by  $T_{f/a}$  and  $H_{f/a}$  in the standard  $EMC$  equation (cf. Equilibrium moisture content).

Finally, the 1-hour timelag fuel moisture content  $MC_1$  [%] for midafternoon observation time is calculated as follows:

$$MC_1 = 1.03 \cdot EMC_{f/a}$$

The 1-hour timelag fuel moisture model can be calculated also on a instantaneous basis, according to the available data.

## References:

Original publication:  
[Deeming et al. \(1977\)](#)

Other publications:  
[Bradshaw et al. \(1983\)](#)  
[Cohen & Deeming \(1985\)](#)

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*The original document is available at <http://wiki.fire.wsl.ch/tiki-index.php?page=1-hour+timelag+dead+fuel+moisture+model>*