

# TECHNICAL NOTE      NUMBER B-11

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

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## METHOD OF DETERMINING MOISTURE CONTENT OF WOOD

The Forest Products Laboratory, Madison, Wis., gives the following directions for determining moisture content of wood:

1. Select a representative sample of the material.
2. Immediately after sawing, remove all loose splinters and weigh the sample.
3. Put sample in an oven maintained at a temperature of 212° to 221° Fahrenheit (100° to 105° Centigrade) and dry until constant weight is attained.
4. Re-weigh the sample to obtain the oven-dry weight.
5. Divide the loss in weight by the oven-dry weight and multiply the result by 100 to get the percentage of moisture in the original sample. Thus,

$$\text{Percentage moisture} = \frac{(W-D)}{D} 100,$$

where

W = original weight as found under 2 above,

D = oven-dry weight as found under 4 above.

### First Step

If possible the sample should be taken at least 2 feet from one end of the piece. Wood gives off or takes on moisture more rapidly from the end grain than from side grain; as a result, there may be considerable difference between the moisture content at the end and elsewhere in a stick. For this reason, a sample from within about a foot of the end of a long board may not be representative.

Short pieces of wood dry out much more rapidly than longer ones. In order to reduce the time required for drying, therefore, the length of the sample in the direction of the grain should usually be about 1 inch. With material 1 square inch or less in cross-sectional area, however, a sample over 1 inch long is generally desirable and the length in this case may be chosen so as to give the sample a volume of 2 or more cubic inches. The other dimensions may be equal to the cross section of the board from which the sample is taken.

## Second Step

It is important that the weight be taken immediately after the sample is cut, for the material is subject to moisture changes on exposure to the air. The degree and rapidity of changes are dependent on the moisture content of the piece and the air conditions to which it is exposed.

In order to insure good results the weights should be correct to within at least  $1/2$  of 1 percent.

The metric system of weights is very convenient in making moisture determinations.

The kind of scales to be used and the size of smallest graduation necessary to insure the specified accuracy will depend on the weight and consequently the size of the sample and kind of wood. Small spring postal scales reading to  $1/2$  ounce are not suitable for accurately weighing small moisture samples.

## Third Step

When placed in the oven for drying, the samples should be open-piled to allow free access of air to each piece. The oven should have some ventilation, thus allowing the evaporated moisture to escape. A thermometer should be provided by which the temperature can be ascertained at any time. Excessive temperatures or

excessive periods in the drying oven will cause distillation of the wood and erroneous results will be obtained. Ordinarily, in the case of low-density woods, 12 hours oven drying is sufficient, while high-density woods may require 48 hours oven drying.

#### Fourth Step

As in the case of the first weight taken, it is essential that the sample be weighed soon after being removed from the oven.

#### Fifth Step

A typical example of the computation necessary for determining the percentage of moisture is given below:

A 2 by 2 by 1 inch sample of air-dry Sitka spruce weighed 30.8 grams. The sample after oven-drying weighed 27.5 grams. Find the moisture content of the sample.

$$\text{Percentage moisture} = \frac{(30.8 - 27.5)}{27.5} 100 = \frac{3.3}{27.5} = 12.$$