

Stacked Timber Measurement

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Measuring timber in stacks at roadside is an effective way to estimate timber volume. It can be done quickly and cheaply by the forest owner and gives a good volume estimate.

Owners will appreciate how important it is to know how much timber is leaving their forest during harvesting. You can't expect to be paid a fair price for what you have produced if you don't know how much you're selling.

That's why it is important to estimate timber volumes either in the forest or when leaving. A number of methods can be used:

- Crop inventory carried out by a qualified professional in the forest prior to and after felling
- Calculations of volumes by modern computerised thinning machines during harvesting
- Stack measurement at roadside
- Calculation of volumes when timber is weighed at mill gate at the sawmill or panel board mill.

Stack measurement at the roadside is a method of volume estimate that owners can carry out themselves.





Teagasc demonstrate stack measurement at field days and shows throughout the country including Tullamore where competitions are arranged to encourage growers to estimate timber volumes.

Stack measurement at roadside is a method of volume estimate, expressed in cubic metres (m^3) that owners can carry out themselves. It involves the calculation of stack volume (space occupied by logs of timber and air spaces in the stack) and converting this to timber volume (space occupied by timber only in the stack) using a conversion factor.

All logs in a stack must be of uniform length and the stack should be built neatly and tidy for easy measurement and accuracy. Large stacking space is required to ensure that all harvested material can be stacked at roadside before it is removed.

Stack length, width and height should be measured as follows:

- **Stack width**

The width of the stack is the specified length of the timber product in the stack i.e. the length of the log. A number of sample lengths should be checked to verify the stack width.

- **Stack length**

Stack length is the average length of the front and back face of the stack. The stack should be measured from the centre point of the outermost logs at one end of the stack to the centre of the outermost logs at the other end.

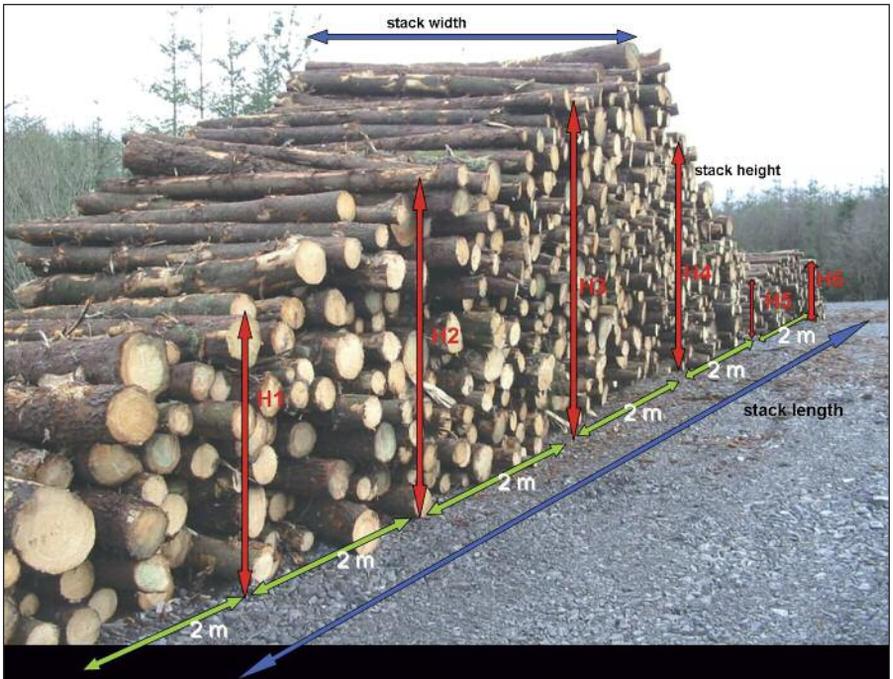
- **Stack height**

Stack height is the perpendicular height from the bottom of the stack to the centre of the highest log at the top of the stack. Average stack height is the average value of a series of height measurements taken along the length of the stack. A minimum of 3–4 measurements should be taken at regular intervals along both faces of the stack or at every two metres (see illustration, overleaf).

The following equipment is required to measure a timber stack: measurement tape (30m) to measure the length and width of the stack; measuring stick to measure stack heights and a calculator.

To measure the volume of the timber stack, proceed as follows: First of all, measure the stack width (in metres), stack length (in metres) and stack height (in metres) as described above. Use the measuring stick to measure the height of the stack (no need to climb the stack).

Then calculate the total volume of the timber stack by multiplying the stack length by the width by the height. This will give you the stack volume in m^3 .



To carry out stack measurement, you need to measure the length, width and height.

As this volume estimate includes air spaces between the logs, a conversion factor is required to convert stack volume (timber volume plus air spaces) to timber volume (volume of timber only).

A commonly used factor is 0.7 although this can vary between 0.6 and 0.75. However, if you want to get more accurate results then you can calculate your own, stack-specific conversion factor.

Example:

Using a 0.7 factor, the volume of timber can be calculated as follows for a stack with the dimensions length 12.0m; width 2.2m; height 1.53m:

Stack Volume	= length x width x height
	= 12.0m x 2.2m x 1.53m
	= 40.39 m ³
Standard Conversion factor	= 0.7
Estimated Pulpwood Volume	= Gross stack volume x Conversion factor
	= 40.39 x 0.7
	= 28.27m ³

Customised stack measurement

A commonly used factor conversion factor is 0.7 although this can vary between 0.6 and 0.75 depending on size of logs. If you want to get more accurate results then you can calculate your own, stack-specific conversion factor by employing an area grid (quadrant) as follows.



Count logs within area grid.

A known area grid (usually $0.7\text{m} \times 0.7\text{m} = 0.49\text{m}^2$) is placed on a face of a stack (represented in blue here). Count (✓) measure (using a ruler) and record the diameter (cm) of all logs that are in the grid. (For those only half in, count only every second one (see ✓ and ✗ above). At least five samples should be taken across both faces of the stack at regular intervals. Divide the total surface area of this known sample grid by the surface area of the logs in the sample by using the following formula:

$$\left\{ \text{Sum of } [(Diameter)^2 \times 0.00007854 \times \text{no of logs in each diameter class}] \right\} / \text{no. of samples taken} / \text{surface area of the quadrant} = \text{Conversion Factor.}$$

Now that both the stack volume and the conversion factor are known, the timber volume can be calculated by applying the following formula:

$$\text{Stack volume} \times \text{conversion factor} = \text{timber volume (m}^3\text{)}$$

If you have difficulty in calculating your own stack specific conversion factor, contact your Teagasc forestry development officer for advice or information on courses in your area. See also Teagasc website (www.teagasc.ie/forestry).