

A GLOSSARY of LOG and TIMBER MEASURES

and other mathematical formulæ, conversion factors, etc.

Compiled and annotated by
L. G. JENNINGS, F.S.S.,
Statistician and Information Officer,
Timber Development Association

| Unit or Measure | Formula or Conversion Factor/s | Usual use | Countries using | | | | | | | | | | | | | | | |
|---|---|--|-----------------------------------|-----------------------|----------|----|----|-----------------------------|----|----|--------------------------|----|----|--------------------------|----|----|------------------------|----------------|
| Au Quart Measure. <i>See</i> Francon Measure | | | | | | | | | | | | | | | | | | |
| Bark Allowance | <p>Where the volume of round logs is being calculated from measurement of the circumference of the log, the presence of the bark can clearly greatly affect the measurements. By far the most satisfactory method is to strip the bark off and then measure the quarter-girth. If measurement is made over bark, usually abbreviated T.O.B. (tape over bark), the allowance may be in the form of the "Liverpool Conventional Allowance" off the dimension of the quarter-girth, or it may be an allowance in the form of a percentage off the total calculated quantity. The percentage allowance varies between England and Scotland and between the various species of trees:</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">England and Wales Per cent.</th> <th style="text-align: center;">Scotland Per cent.</th> </tr> </thead> <tbody> <tr> <td>Conifers</td> <td style="text-align: center;">7½</td> <td style="text-align: center;">10</td> </tr> <tr> <td>Ash, sycamore, beech, birch</td> <td style="text-align: center;">7½</td> <td style="text-align: center;">7½</td> </tr> <tr> <td>Poplar, elm, alder, lime</td> <td style="text-align: center;">15</td> <td style="text-align: center;">15</td> </tr> <tr> <td>Oak, chestnut and others</td> <td style="text-align: center;">10</td> <td style="text-align: center;">10</td> </tr> </tbody> </table> | | England and Wales Per cent. | Scotland Per cent. | Conifers | 7½ | 10 | Ash, sycamore, beech, birch | 7½ | 7½ | Poplar, elm, alder, lime | 15 | 15 | Oak, chestnut and others | 10 | 10 | Measuring round timber | United Kingdom |
| | England and Wales Per cent. | Scotland Per cent. | | | | | | | | | | | | | | | | |
| Conifers | 7½ | 10 | | | | | | | | | | | | | | | | |
| Ash, sycamore, beech, birch | 7½ | 7½ | | | | | | | | | | | | | | | | |
| Poplar, elm, alder, lime | 15 | 15 | | | | | | | | | | | | | | | | |
| Oak, chestnut and others | 10 | 10 | | | | | | | | | | | | | | | | |
| Board Feet Measure. <i>See</i> Foot Board Measure. | | | | | | | | | | | | | | | | | | |
| Billion. <i>See also</i> Milliard | <p>= 1,000,000 million (English) = 1,000 million (American)</p> | | | | | | | | | | | | | | | | | |
| Brereton Rule | <p><i>Method:</i> An average is taken in inches of the two diameters at each end of the log, then:</p> <p><i>Formula:</i> $\text{Volume} = \frac{\text{Length (ft.)} \times \pi (3.1416) \times \text{diameter (ins.)}^2}{4 \times 12} = \text{board ft.}$ or $\text{Length} \times \text{diameter}^2 \times 0.7854 = \text{board ft.}$ </p> | Log measure | North America | | | | | | | | | | | | | | | |
| British Columbia Log Rule | <p><i>Method:</i> The average diameter at the top end of the log over bark is taken and 1½ inches deducted for bark; an allowance of ¼ inch is given for sawkerf for each 1-inch board, or in other words 3/8 of the volume.</p> <p><i>Formula:</i> $\text{Volume} = \frac{\text{Length (ft.)} \times \pi (3.1416) \times (\text{diameter (ins.)} - 1\frac{1}{2} \text{ in.})^2}{4} \times \frac{8}{11} \times \frac{1}{12} = \text{board ft.}$ </p> | Board measure that can be produced from a good log | North America | | | | | | | | | | | | | | | |

| Unit or Measure | Formula or Conversion Factor/s | Usual use | Countries using |
|--|---|---|--|
| Standard--Drammen | = 121 $\frac{1}{4}$ cubic feet. = 120 pieces of 1 $\frac{1}{4}$ ins. \times 9 ins. \times 13 feet. | No longer in use | |
| Standard — Gothenburg | = 180 piled cubic feet of roundwood. = 6 ft. \times 6 ft. \times 5 ft. of piled roundwood. = 125.8 solid cubic feet. = 120 solid cubic feet when used by the National Coal Board. = 120 pieces of 2 ins. \times 9 ins. \times 12 feet of sawn wood, or 180 cubic feet. | Usually for measuring pitwood; the sawn wood standard of 180 cubic feet is no longer in use in the United Kingdom | United Kingdom |
| Standard — Dublin (sometimes referred to as the "Irish" or "London" Standard in the past) | = 270 cubic feet. = 120 pieces of 3 ins. \times 9 ins. \times 12 feet. | Softwood measure | Eire |
| Standard — Petrograd (also known as the St. Petersburg standard in Nubaltwood charter, Albion and Uniform contracts) | = 165 cubic feet (150 cubic feet for Upper Gulf hewn baulks). = 1,980 foot board measure. = 4.672 cubic metres. = 2 $\frac{1}{2}$ tons approx.* = 3.3 loads.* = 120 pieces of 1 $\frac{1}{4}$ ins. \times 11 ins. \times 12 feet or its equivalent. * Ref.: H.M. Customs and Excise: <i>Annual Statement of the Trade of the United Kingdom, Vol. 2, 1937.</i> | Measure for softwood, and in the United Kingdom for boxboards, sleepers and telegraph poles | United Kingdom, Russia, Scandinavia mainly |
| Standard—Quebec | = 229 $\frac{1}{2}$ cubic feet. = 100 pieces of 2 $\frac{1}{2}$ ins. \times 11 ins. \times 12 feet. | Measure for sawn timber | Canada (Quebec) |
| Stère (or Ster). See also Raum-meter | = 1 piled cubic metre of roundwood. = 0.75 cubic metre of solid wood. = 26.5 cubic feet of solid wood. <i>If used for fuelwood:</i> 1 Stère of coniferous round fuelwood = 0.70 solid cubic metres or 24.7 solid cubic feet. 1 Stère of non-coniferous round fuelwood = 0.65 solid cubic metres or 23.0 solid cubic feet. <i>If used for pulpwood:*</i> 1 Stère = 1 cubic metre of roundwood. 1 Stère piled unbarked = 0.65 cubic metres solid = 23.0 cubic feet solid. * Used by the Bowater Paper Corporation, London. | Metric measure for piled assortments of wood | European |
| String Measure. See Customs Fund String Measure | | | |
| Super Feet (Superficial measure). See also Foot Board Measure | Length \times breadth, but is often understood to mean length \times breadth \times 1 inch thick. In Australia and New Zealand it is used as the general timber measure of volume. = 12 ins. \times 12 ins. \times 1 in. = $\frac{1}{8}$ cubic feet. | Usually used as a square measure for flooring, etc. in the United Kingdom | |
| Square | Superficial measure of 100 square feet irrespective of thickness. | Usually used as a square measure for flooring, etc. in the United Kingdom | |
| Ton | English (or long ton) = 2,240 lbs. = 1.016 metric tons. Short = 2,000 lbs. = 907.1 kilograms = 0.892 English tons. Metric = 0.9842 English tons. = 2,204.6 English lbs. = 1.102 short tons. = 0.4 Standards = 1.32 loads = 0.55 piled cubic fathoms of wood or timber. 1 ton of Plywood = 40 cubic feet. | | |
| Weights of Wood. See Specific Gravity (Wood) | | | |

NOTE

Whilst every care has been taken in collating the glossary of tree, log and timber measures and mathematical formulae and conversion factors used by the timber trade, the author and publishers do not hold themselves responsible for any errors which may appear in the text. Grateful acknowledgment is made to the authors of the following reference books, information from which has been used for part of the text: Fairbairns, A. W.: *Measurement of Round Logs*; Mallinson and Grugeon: *Timber Trade Practice*.

| Unit or Measure | Formula or Conversion Factor/s | Usual use | Countries using |
|--|---|--|--|
| Piled Cubic Fathom | = 216 piled cubic feet (6 ft. × 6 ft. × 6 ft.). = 151 solid cubic feet approx. = 4.28 solid cubic metres. = 0.915 standards of sawn softwood. = 2.4 loads. Conversion factors used by the Bowater Paper Corporation are: 1 piled unbarked cubic fathom = 140.94 cubic feet solid = 3.99 cubic metres solid. | United Kingdom imports of pit-wood and round-wood logs of pine, spruce and aspen | United Kingdom, Scandinavia |
| Quarter-girth Measure (113 Divisor). See Customs Fund String Measure | | | |
| Raam-Meter. See also Stère | = 1 cubic metre (1 m. × 1 m. × 1 m.) of piled roundwood (usually pulpwood). = 0.75 cubic metre of solid wood for pulpwood and pitprops, without bark = 26.5 cubic feet of solid wood. = 0.70 cubic metre of coniferous pulpwood. = 0.65 cubic metre of broadleaved (hardwood) fuelwood = 23 cubic feet of solid wood. | Metric measure usually used for piled assortments of wood | Continental, particularly Austria, Germany and Switzerland |
| Russian Fathom | = 343 piled cubic feet (7 ft. × 7 ft. × 7 ft.). = 6.80 cubic metres of solid wood. = 240 cubic feet of solid wood. | Measure for round-wood | |
| Scribner Rule Measure | This is based on calculations obtained from diagrams drawn to show how many inch boards can be sawn from a log allowing for waste. The length and diameter of logs are measured and the number of board feet is obtained from tables. | Board measure that can be produced from a good log | North America |
| Scribner Decimal Rule Measure | Similar to Scribner Rule above, but the number of board feet is calculated to the nearest 10 feet. | Board measure that can be produced from a good log | North America |
| Scribner-Doyle Rule Measure | A combination of the two measuring systems above, in which the Doyle Rule is used for logs up to 26-inch diameter and the Scribner Rule for logs of and above that limit. | Board measure that can be produced from a good log | North America |
| Ship load, timber | Softwood timber is carried in vessels with a capacity ranging from as little as 100 standards from the Baltic to as much as 2,200 standards from Canada. An approximate estimate of a ship's timber carrying capacity is two-thirds the net tonnage of the vessel. The deck load of timber usually comprises approximately one-third and underdeck two-thirds. | | |
| Spaulding Rule Measure | This is based on calculations obtained from diagrams drawn to show how many inch boards can be sawn from a log allowing for waste; tables are available. It is slightly different from the Scribner Rule, and shows a smaller return from smaller logs. | Board feet that can be produced from a good log | North America |
| Specific Gravity (Wood) | The specific gravity of a wood is the ratio between the weight of the wood (oven-dry unless otherwise stated) and an equal volume of water. A cubic foot of water weighs 62.4 lbs.; therefore, given the specific gravity of a wood, its weight in pounds per cu. ft. can be calculated by multiplying this figure by 62.4. It must be remembered that the weight so obtained will generally be the oven-dry weight, i.e. the weight at a moisture content of nought per cent.—a condition in which wood is seldom if ever used. The weight of wood is usually quoted at 15 per cent. moisture content, or "air-dry." In order to calculate the weight at this increased moisture content, it is necessary to take into consideration the increase in volume which absorption of moisture inevitably causes. The Forest Products Laboratory have worked out a formula which gives an average figure for such an air-dry weight; extreme accuracy cannot be obtained as the degree of swelling with a rise in moisture content varies with different species of wood. The formula is as follows: Average weight, in lb. per cu. ft. at 15 per cent. moisture content = 65.5 × S ₀ , where S is equal to the specific gravity of the wood based on oven-dry weight, and oven-dry volume. Ref.: <i>T.D.A. Quarterly Review</i> , January 1946, p. 8. | | |
| Standard—Christiana | = 103½ cubic feet. = 120 pieces of 1½ ins. × 9 ins. × 11 feet. | No longer in use | |

| Unit or Measure | Formula or Conversion Factor/s | Usual use | Countries using |
|---|--|--|--|
| Liverpool Sales Measure | A system which was used for measuring mahogany square logs, the main object being to make an allowance for the conversion of the logs into lumber. One-eighth of an inch was added to the standard inch to cover the saw "kerf," so that in effect, the mahogany inch was $1\frac{1}{8}$ inch. To facilitate the measuring, special mahogany rules were manufactured, showing "Mahogany Inches" on one side and actual inches on the other. | Measuring square mahogany logs | |
| Liverpool String or Quarter-girth Measure | A method of measuring the quarter-girth of round logs by passing a string round the log, doubling it into four, and then measuring the folded string on an ordinary rule; this gave the actual measure of the quarter-girth. This method is no longer in use, and has been superseded by the tape measure, which gives the same result. The tape is spaced in lengths of four inches, each marked one inch, so that when passed round the log it shows the quarter-girth. As in the case of the <i>Hoppus Measure</i> (which see for formula) the 144 divisor is used, except in the case of measurement for Customs, Dock Dues, etc., purposes where the 113 divisor is insisted upon (see <i>Customs Fund String Measure</i> for formula). | Measuring round logs | United Kingdom |
| Load (of Timber) | = 50 cubic feet approx. of hewn softwood. = 50 cubic feet of hardwood (for contract quantities). = 40 cubic feet of hardwood (for shipping measurements). = 0.303 standards of sawn softwood or planed or dressed softwood and hardwood. | Railway measure for freight costing; also used for "Albion" and "Uniform" importing contracts. | United Kingdom |
| Log Measurement. <i>See also Appendix I</i> | True volume may be calculated by the formula: $\text{Volume} = \frac{\text{Length} \times \text{area of one end} + (\text{area of other end})}{2}$ (this is rarely used by the Timber Trade, as in practice logs do not conform to the geometrical cone formation envisaged by the calculation). | Log measure | |
| Metric Log Measures (Full measure) also: Cubic Metre Réel; Cubage au Cinquieme; Holzmarkt; Kohlmann | <i>Formula:</i> Volume = Length (metres) \times radius (metres) ² \times π (3.1416) = cubic metres (i.e. true contents of cylinder). | Log measure | Countries using the metric measure |
| Mille (of sleepers) | <i>Formula:</i> Number of pieces \times thickness in ins. \times width in ins. \times length in feet \div 12 = foot board measure. | For measuring wooden sleepers | North America |
| Mille (of hardwood staves) | = 1,200 pieces of hardwood staves. | Measuring hardwood staves | Port of London Authority |
| Milliard | = 1,000 million (metric). | | |
| Minnesota Standard Rule Measure | Practically the same as the <i>Scribner Rule</i> . | Board feet that can be produced from a good log | North America |
| Moulmein Timber Calculator | A timber calculator showing, by means of tables, the cubical contents of logs and timber of given dimensions; running feet per ton and the number of pieces per ton of various sizes; and also timber price calculations in Rupees and Sterling Currency. Compiled by Tsong Ah Phutt of Moulmein, Burma. | Measuring teak | Burma, especially the port of Moulmein |
| Norsk Inch or Norwegian Inch | Nearly 3 per cent. longer than the English inch. Commonly used for sawing measurements to allow for the normal shrinkage from fresh sawn to shipping dry. | | |
| One-fifth Rule Measure | <i>Formula:</i> $\text{Volume} = \text{Length} \times \frac{(\text{girth})^2}{5} \times \frac{1}{12} = \text{board feet.}$ <i>Note:</i> This is half the volume calculated under the U.S.A. <i>Fifth Rule</i> , and seems to have little to recommend it. | Log measure | |
| Percentage Increases | <i>Example:</i> To find the percentage increase in price from £15 to £60: $60 - 15 = 45$ $\frac{45}{15} \times 100 = \frac{4,500}{15} = 300 \text{ per cent.}$ | | |

| Unit or Measure | Formula or Conversion Factor/s | Usual use | Countries using |
|--|--|--|--------------------------------|
| Fifth Rule (U.S.A.) | <p><i>Method:</i> The mid-girth is first measured in inches.</p> <p><i>Formula:</i> $\text{Volume} = \frac{\text{Length (ft.)} \times \text{girth (ins.)}^2 \times \frac{1}{4}}{4 \times \pi (3.1416)} = \text{board feet}$</p> | Log measure | United States of America |
| Foot Board Measure (Abbr. F.B.M.). See also Super feet | <p>= 12 ins. × 12 ins. × 1 in. = $\frac{1}{4}$th cubic foot. 1,980 F.B.M. = 1 standard (of 165 cubic feet). 1,000 F.B.M. (Abbr. M.f.b.m.) = 83.3 cubic feet = 2.36 cubic metres = 0.505 standards. Price per 1,000 f.b.m. to price per standard = Value × 1,980 ÷ 1,000.</p> | Log and lumber (sawn timber) measure | North America |
| Francon Measure | <p><i>Method:</i> The circumference of the log is measured at its mid-length in metres by string or tape.</p> <p><i>Formula:</i> $\text{Volume} = \text{Length (metres)} \times \text{circumference (metres)}^2 \times 0.0625 = \text{cubic metres.}$</p> <p><i>Note:</i> 1 cubic metre Francon measure = 35.315 cubic feet Hoppus measure (Hoppus 113 measure).</p> | Log measure | South America, French Colonies |
| Haakon Dahl Measure. See Francon Measure | | | |
| hectare | = 2.471 acres = 10,000 square metres = 0.003861 square mile | Land or forest area measure | European Continent |
| Holzmarkt Measure. See Metric Log Measure | | | |
| Hoppus Measure (144 Divisor). See also Appendix I | <p>Measurement by this method gives about 21½ per cent. less than true contents as given by the Customs Fund or Quarter-Girth measures (113 Divisor): 1 Hoppus cubic foot = 1.273 actual cubic feet.</p> <p><i>Method:</i> The circumference of the log is measured at its mid-length in inches by string or tape and divided by 4 to give the quarter-girth.</p> <p><i>Formula:</i> $\text{Volume} = \frac{\text{Length (ft.)} \times \text{quarter-girth (ins.)}^2}{144} = \text{Hoppus cubic feet}$</p> | Log or tree measure: for similar measures giving contents in metric measure. See Francon, au Quart and Haakon Dahl | United Kingdom |
| Hyslop-Rule Measure | Practically the same as the Scribner Rule | Board feet that can be produced from a good log | North America |
| Interest, Simple | <p>When: I = Interest P = Principal T = Time R = Rate per cent.</p> <p>Formula to find interest: $\frac{P \times T \times R}{100}$</p> <p>Formula to find principal: $\frac{100 \times I}{T \times R}$</p> <p>Formula to find time: $\frac{100 \times I}{P \times R}$</p> <p>Formula to find rate: $\frac{100 \times I}{P \times T}$</p> | | |
| International Rule Measure | <p>This measure allows for taper of $\frac{1}{8}$ inch increase in diameter for each 4 feet of length from the small end of the log. For each 1-inch board, allowances are made of $\frac{1}{16}$ inch shrinkage and $\frac{1}{8}$ inch saw-kerf.</p> <p><i>Formula:</i> $\text{Volume} = (\text{diameter}^2 \times 0.22) - 0.71 \text{ diameter for each 4 foot section} = \text{board feet.}$</p> | Board feet that can be produced from a good log | North America |
| Kohlmann Measure. See Metric Log Measures | | | |
| Liverpool Conventional Allowance. See Bark Allowance | | | |

| Unit or Measure | Formula or Conversion Factor/s | Usual use | Countries using |
|--|---|---|--|
| Caliper Measure. See also Appendix I | <p><i>Method:</i> The diameter is measured by calipers in inches at mid-length of the log then:</p> <p><i>Formula:</i> Volume = $\frac{\text{Length (ft.)} \times \pi (3.1416) \times \text{diameter (ins.)}^2}{144 \times 4}$ = cubic ft.</p> <p>or</p> <p>Volume $\times \frac{\text{Length (ft.)} \times \text{diameter (ins.)}^2}{183.34}$ = cubic ft.</p> <p>(in practice the divisor is generally used as 183 only)</p> <p>Logs hewn partly square are also sold on Caliper Measure in India, Burma and Ceylon. This equals maximum caliper readings between hewn faces times length.</p> <p><i>Formula:</i> Volume $\times \frac{\text{Length (ft.)} \times \text{Width (ins.)} \times \text{Thickness (ins.)}}{144}$ = cubic ft.</p> | Measuring hardwood logs and roundwood | United Kingdom Port and Customs authorities, and in Burma, Ceylon and India |
| Cord Measure | <p>8 ft. \times 4 ft. \times 4 ft. = 128 stacked cubic feet = 75 solid cubic feet = 3.625 stacked cubic metres = 2.12 solid cubic metres.</p> <p>1.76 cords = 1 piled cubic fathom of pitwood or pulpwood in Canada.</p> <p>Conversion figures used by the Bowater Paper Corporation, London: 1 cord piled unbarked = 83.52 cubic feet solid = 3.625 cubic metres piled = 2.365 cubic metres solid</p> <p>1.69 piled unbarked cords = 1 piled cubic fathom pitwood or pulpwood.</p> | Measure for stacked pitwood, pulpwood or fuelwood in the round | |
| Cubage au cinquieme Measure. See Metric Log Measures | | | |
| Cubic foot | <p>= 12 ins. \times 12 ins. \times 12 ins. (English).</p> <p>= 0.02832 cubic metres.</p> <p>= 0.00606 standard (of 165 cubic feet).</p> <p>= 0.0472 cubic metres round wood.</p> <p>1 cubic foot of solid timber = 1.67 cubic feet roundwood. = 1.53 cubic feet piled unbarked roundwood = 0.0434 cubic metres piled unbarked roundwood.</p> | Measuring timber (especially hardwood in the United Kingdom) | Gt. Britain, British Commonwealth, etc. |
| Cubic metre | <p>= 35.315 cubic feet</p> <p>= 423.728 board feet (12 ins. \times 12 ins. \times 1 in.) of sawn wood</p> <p>= 0.214 standards (of 165 cubic feet) of sawn wood</p> <p>= 35.315 cubic feet of roundwood (Hoppus 113 measure)</p> <p>= 27.72 Hoppus cubic feet of roundwood (Hoppus 144 measure)</p> | Continental log and timber measure, and timber statistics issued by F.A.O. of United Nations; also United Kingdom plywood import statistics | |
| Cubic Metre Réel Measure. See Metric Log Measures | | | |
| Customs Fund Measure; Customs Caliper Measure. See Caliper Measure | | | |
| Customs Fund String Measure (113 Divisor), or String Measure, or Quarter-girth Measure | <p><i>Method:</i> The circumference of the log is measured in the middle or at various places in its length by string or tape and an average figure for the circumference of the log obtained; this is divided by 4 to give the quarter-girth.</p> <p><i>Formula:</i> Volume = $\frac{\text{Length (ft.)} \times \text{average quarter-girth (ins.)}^2}{113}$ = cubic feet</p> | Log measure | United Kingdom |
| Doyle Measure | <p><i>Method:</i> A deduction of 4 inches from the diameter is made for slabs.</p> <p><i>Formula:</i> Volume = $\frac{\text{Length (ft.)} \times (\text{diameter (ins.)} - 4 \text{ ins.})^2}{16}$ = board feet</p> | Board feet measure that can be produced from a good log | North America |
| Festimeter | = 1 cubic metre of roundwood felled, or 1 cubic metre of standing timber. | Continental log measure | European, particularly Austria, Germany and Switzerland |

| | | |
|--------------|---|----------|
| engl. Zoll | = | 25,4 mm |
| schwed. Zoll | = | 24,74 mm |
| finn. Zoll | = | 24,74 mm |
| norw. Zoll | = | 26,15 mm |
| dän. Zoll | = | 26,15 mm |