

ICS

English version

Round and sawn timber - Method of measurement of
dimensions - Part 2: Round timber - Requirements for
measurement and volume calculation rules

Bois ronds et bois sciés - Méthode de mesure des dimensions
- Partie 2 : Bois ronds - Exigences pour la
mesure et les règles de calcul du volume

Rund- und Schnittholz - Verfahren zur Messung der Masse
- Teil 2: Rundholz - Anforderungen an die Messung und
Regeln zur Volumenberechnung

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (prEN 1309-2:2005) has been prepared by Technical Committee CEN/TC 175 "Round and sawn timber", the secretariat of which is held by AFNOR.

This document is currently submitted to the formal vote.

Annex A is informative.

Annex B is normative.

Introduction

There are many different round timber measurement and volume calculation rules in Europe. These have come into being based on historical influences and traditions. Much sawmilling and forestry data is based on these differing rules. Because of the diversity of existing rules in different countries, and in some cases between different regions in the same country, it is currently impossible to lay down a single set of acceptable rules for all member states.

This standard therefore gives basic principles which are to be followed when drawing up round timber measurement and volume calculation rules. Examples of rules currently in use and which meet these principles are listed in informative annex A. Normative annex B applies where no national, regional or provincial rules exist.

This standard is one of a series, being methods of measurement for round timber and sawn timber. Other standards in this series are:

- EN 1309-1 *Round and sawn timber – Method of measurement of dimensions - Part 1: Sawn timber*
- EN 1310 *Round and sawn timber – Method of measurement of features*
- EN 1311 *Round and sawn timber – Method of measurement of biological degrade*
- EN 1315-1 *Dimensional classification – Part 1: Hardwood round timber*
- EN 1315-2 *Dimensional classification – Part 2: Softwood round timber*

1 Scope

This European Standard defines the principles which are to be used in the derivation of round timber measurement and volume calculation rules. This standard applies to rules for measuring hardwood and softwood felled round timber. It does not apply to tropical timber.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 844-1 *Round and sawn timber – Terminology – Part 1 : General terms common to round timber and sawn timber*

EN 844-2 *Round and sawn timber – Terminology – Part 2 : General terms relating to round timber*

EN 844-5 *Round and sawn timber – Terminology – Part 5 : Terms relating to dimensions of round timber*

EN 844-7 *Round and sawn timber – Terminology – Part 7 : Terms relating to anatomical structure of timber*

EN 844-8 *Round and sawn timber – Terminology – Part 8 : Terms relating to features of round timber*

EN 844-12 *Round and sawn timber – Terminology – Part 12 : Additional terms and general index*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 844-1, EN 844-2, EN 844-5, EN 844-7, EN 844-8 and EN 844-12 apply.

4 Measurement and volume calculation of round timber

4.1 General

Round timber measurement and volume calculation rules shall include as a minimum the following requirements when establishing the parameters that are to be used when calculating volume. Where no national, regional or provincial rules exist, the methods specified in Annex B shall apply.

4.2 Length

4.2.1 Apparatus

A manual or automatic measuring device shall be specified. The requirements of calibration and accuracy shall be stated

4.2.2 Methods of measurement

Rules shall clearly define how the length of the following types of timber shall be measured

- straight round timber;
- round timber with a simple sweep;

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- round timber with multiple sweep;
- round timber with undercut or a butt trimming.

4.2.3 Recording results

The unit of metric measurement shall be stated. If a nominal length is required the length shall be rounded down to the nearest nominal length. The rounding conventions shall be specified.

4.3 Diameter

4.3.1 Apparatus

A manual or automatic measuring device shall be specified. The requirements of calibration and accuracy shall be stated.

4.3.2 Methods of measurement

Rules shall define:

- where the diameter is to be measured;
- the procedure when the preferred measuring point is not available;
- the number of measurements to be made when using the specified apparatus;
- whether the measurement is to be taken over or under bark and any conversion methods.

4.3.3 Recording of results

The unit of metric measurement shall be stated.

When two or more measurements are taken the procedure for calculating the mean shall be defined.

The rounding convention used when expressing results shall be stated.

4.4 Calculation of volume

The unit of metric measurement shall be stated.

Rules shall show the formula by which the volume is calculated.

The rounding convention used shall be stated.

5 Measurement and volume calculation of stacks

5.1 Apparatus

A manual or automatic measuring device shall be specified. The requirements of calibration and accuracy shall be stated.

5.2 Methods of measurement

The unit of metric measurement shall be stated.

If the volume determination is based on width, depth and length, rules shall define how these shall be measured. Rules shall also describe the number and position of measurements required to be taken dependent on the type of stack.

5.3 Determination of stacked volume

The unit of metric measurement shall be stated.

Rules shall show the formula by which the volume is calculated.

If solid volume of stack is to be calculated, rules shall define the calculation procedure.

The rounding convention used shall be stated.

6 Measurement of weight – round timber and stacks

6.1 General

There are two measures of the weight of wood: dry weight or green weight. The method of determination for each method of weight measurement shall be specified.

6.2 Apparatus

Calibrated measuring devices shall be specified together with the required degree of accuracy.

6.3 Methods of measurement

It shall be specified how the weight of round timber and stacks shall be calculated for each method of weight measurement.

6.4 Recording results

Weight shall be expressed in metric tons or kilograms.

The rounding convention used when expressing results shall be stated.

When two or more measurements are taken the procedure for calculating the mean shall be defined.

Annex A (informative)

Examples of round timber measurement and volume calculation rules that meet the requirements given in this standard

Unofficial translations in italics.

A.1 Austria

- Österreichische Holzhandelsusancen 1973; edition 2001
- ÖNORM L 1021; edition 2001-04-01

A.2 Czech Republic

- ČSN 48 0007 Tabulky objemu kulatiny podle středové tloušťky *Tables of logs volume according to mid diameter*
- ČSN 48 0008 Tabulky objemu výřezů podle čepové tloušťky *Tables of logs volume according to top diameter*
- ČSN 48 0009 Tabulky objemu kulatiny bez kůry podle středové tloušťky měřené v kůře *Volume tables of roundwood under bark according to mid diameter measured over bark*
- ČSN 48 0050 Surové dříví – Základní a společná ustanovení *Rough wood – Basic and common regulations*
- ČSN 48 0055 Jehličnaté sortimenty surového dříví – Technické požadavky *Coniferous assortments of raw wood – Technical requirements*
- ČSN 48 0056 Listnaté sortimenty surového dříví – Technické požadavky *Broadleaved assortments of raw wood – Technical requirements*

Examples of determination of timber volume by weight (not stated in ČSN 48 0050):

- Measurement of timber by green weight.

Green weight of each delivery is determined as the difference between brutto weight found out on the arrival in the mill (weight of a truck + load) and the weight of a truck after unloading. Larger cover of snow, ice or rime has to be removed from the load.

Timber is weighed at the calibrated weighbridge (railweight) with the printer. One mark on a scale is 50 kg at maximum. Weigh card is printed specifying the weight of load and all identification numbers of load.

- Measurement of timber by oven-dry weight.

This method is based on comparison of green weight of a sample with its oven-dry weight.

- Taking of samples

Samples are taken from each delivery in a representative way. Takings of sawdust samples are conducted by a motor saw, at least on 10 pieces of timber loaded on trucks or 15 pieces of timber loaded on wagons. A cut made with the motor saw shall go through of a half of log diameter all the way to the heartwood and samples are taken at the distances at least 25 cm from the each end of a log. Sawdust from one delivery is mixed together and put into a suitable transport packing preventing sawdust from the dry-up. The packing shall be labeled with all identification numbers.

- Determination of dry matter of samples

Dry matter is expressed as a share of oven-dry and green weights of a sample. Green weight of a sample is determined immediately after sampling. For drying from a mixed sample at least 150 g must be taken and weight calibrated with accuracy of 0.01 g. Drying is under way for 8 to 12 hours in laboratory drying box with air circulation at temperature $(103 \pm 2)^\circ \text{C}$ up to the constant weight of a sample. After the dry-up, a sample shall be weighed to determine oven-dry weight. Dry matter is a share of oven-dry weight of a sample and its green weight.

Formula: $w_{dm} = \frac{m_0}{m_w}$ where: m_w is green weight of a sample
 m_0 is oven-dry weight of a sample
 m_{dm} is dry matter

- Determination of oven-dry weight of load

Oven-dry weight of load is calculated as the product of green weight and dry matter as follows:

$$G_0 = G_{gw} \times w$$

where: G_0 is oven-dry weight

G_{gw} is green weight

Taking of samples, determination of weight, drying, calculations and records are conducted by skilled person who is supervised by an independent body. Detailed technical conditions are set out according to the national rules.

A.3 Finland

- Hakkuukonemittaus (MMM*:n määräykset nro 100/99 Dnro 2424/66/99 27.10.1999) *Scaling of timber by harvesters or timber measurement using harvesters*

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Puutavarapölkkyjen mittaus (Maa- ja metsätalousministeriö asetus Nro 74/ 02 18.11.2002 Dnro 2929/67/2002) *Scaling of individual logs or solid volume measurement of logs. The method is normally used to measure piece-by-piece both manually and automatically based on this directive.*

- Pölkkyttäin mittaavien puutavaran tehdasmittalaitteiden tarkastusohje (MMM*:n määräykset nro 47/01 Dnro 1915/67/2001 20.6.2001) *The control directive of scaling of logs using automatic measurement devices at the mills*
- Pinomittaus (Dnro 2409/66/97 16.6.1997 Maa- ja metsätalousministeriö Ohje 9.6.1997) *Measuring of piled or stacked pulpwood; it is normally used to measure the pulpwood in piles at the roadside or stacks on vehicles or railway wagons.*
- Otantaan perustuvat mittausmenetelmät (Maa- ja metsätalousministeriö Ohje 1.3.1997) *Methods based on random sampling such as sampling for weight scaling of timber, sampling for stacked volume scaling of bundles and sampling for scaling units (logs, bundles, loads) or sampling for drymass of industrial and pulpwood chips.*
- Kehyskuvamittaus (Dnro 2409/66/97 16.6.1997 Maa- ja metsätalousministeriö Ohje 9.6.1997) *Image scanning scaling –system, so called AVM (=Automated Volume Measurement) 1000; it is based on the utilization of laser and video camera technology in the measurement of pulpwood arriving by road or rail.*
- Puutavarakuorman mittaus kehyskuvamenetelmään ja tiivyyden määrittämiseen perustuen (MMM* määräykset nro 137/99 Dnro 3742/66/99 17.12.1999) *Image scanning scaling based on determining the stack density, so called AVM 100.*
- Puutavaran työ- ja luovutusmittaus tehtaalla (Maa- ja metsätalousministeriö Yleisohje 1.3.1997) *The general directive of timber scaling at the mills.*
- Pystymittaus 1 (Dnro 3508/66/97 8.9.1997 Maa- ja metsätalousministeriö Ohje) *Measurement of standing trees 1. (Scaling method rarely used nowadays).*
- Pystymittaus 2 (Dnro 1481/66/95 16.3.1995) *Measurement of standing trees 2, or scaling of standing trees by forest worker (the logger).*
- Kehämittaus (Dnro 2086/66 MMM* 1992 5.10.1992) *Samples using circular sample areas of measurement; (method rarely used nowadays).*
- Kuormainvaakamittaus (MMM*:n määräykset nro 47/99 Dnro 967/66/99 13.4.1999) *Scaling using the loader mounted weight scales of a forwarder*
- Puutavaran laadun mittaus laatuositemenetelmällä (MMM* määräykset nro 159/99 Dnro 4759/66/99 17.12.1999) *Timber quality scaling based on stratified random sampling*

*) MMM = Maa- ja metsätalousministeriö = Ministry of Agriculture and Forestry

Methods which have been approved on testing:

- *The loader mounted weight scale of timber truck; it will be used to measure small pulpwood lots.*
- *Log bundle measuring system for timber trucks, so called MODUS 2000, based on three scanning distance lasers and one laser distance sensor.*

A.4 France

AFNOR NF B 53-020 : Bois - Cubage des bois ronds et assimilés – Juillet 1991

A.5 Germany

- Gesetz über gesetzliche Handelsklassen für Rohholz „Forst-HKIG“ vom 25. Februar 1969 (Bundesgesetzblatt 1969 Teil I, Seite 149)
- Verordnung über gesetzliche Handelsklassen für Rohholz (HKIV) vom 31. Juli 1969 (BGBl. I S. 1075)
- Anlage zu § 1 der Verordnung über gesetzliche Handelsklassen für Rohholz (HKS)
- Vereinbarung über Werkeingangsvermessung des DHWR/VDS und des DFWR 1994/2000

A.6 Ireland

- Timber Measurement Manual 1999, COFORD

A.7 Italy

- Various regulations of Chambers of Commerce of each Province (e.g. Central Alps, South Tyrol)

A.8 Lithuania

- Lietuvos apvaliosios medienos ir nenukirsto miško matavimo ir tūrio nustatymo taisyklės *Lithuanian rules for measurement of round timber, standing trees and volume estimation* (Žin., (Official Gazette) 2003, Nr. 20-873; valid since 27 02

A.9 Netherlands

- Richtlijnen voor het meten van inlands rondhout ten behoeve van de verkoop (Bosschap, december 2002).

A.10 Norway

- Tommermalingsforeningenes Fellesorgan (TMF) (sanctioned by FUNT 12.03.98, effective 01.08.98)

A.11 Sweden

Mättningsinstruktioner för rundvirkessortiment rekommenderade av Virkesmättningsradet. VMR 1-99 med komplement 2000-05-30. *Regulations for measuring of roundwood recommended by the Timber Measurement Council 99-05-19*

A.11 Switzerland

- Handelsgebräuche für Rundholz 2000 (SHIV/ASIB)

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A.13 United Kingdom

- Timber Measurement – A Field Guide (Forestry Commission Booklet 49. Forestry Commission, Edinburgh. ISBN: 0 85538 403 4)
- Top Diameter Sawlog Tables (Forestry Commission Field Book 1 (2nd Ed.). Forestry Commission, Edinburgh. ISBN: 0 85538 402 6)
- Classification and Presentation of Softwood Sawlogs (Forestry Commission Field Book 9 (2nd Ed.). HMSO, London. ISBN: 0 11 710322 5)
- Mid Diameter Volume Tables (Forestry Commission Field Book 11 (3rd Ed.). HMSO, London. ISBN: 0 11 710287)

Annex B (normative)

Measurement and volume calculation rules to apply when no national, regional or provincial rules exist

B.1 Length

B.1.1 Apparatus

A calibrated measuring device, graduated to give an accuracy of at least one centimetre.

B.1.2 Methods of measurement

B.1.2.1 Straight round timber or timber with a simple sweep

Measure the shortest length, as the distance between two parallel planes, one at each end of the round timber, where the full cross section is enclosed and perpendicular to the longitudinal axis.

B.1.2.2 Round timber with a compound sweep

Round timber with a compound sweep shall be divided at theoretical crosscut points into straight portions or portions with a single sweep.

The length of each portion shall be individually measured.

B.1.2.3 Timber with an undercut or a butt trimming

Measure as specified in B.1.2.1 or B.1.2.2 but at the undercut or butt trimming end measure from the middle of the undercut or the butt trimming surface.

B.1.3 Recording of results

The length shall be expressed in metres to one place of decimal rounded down.

If a nominal length is required the length shall be rounded down to the nearest nominal length.

In case of a round timber with a compound sweep, the lengths of portions as defined in B.1.2.2 shall be totalled. The result shall be expressed in metres to one decimal place rounded down.

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B.2 Diameter

B.2.1 Apparatus

A calibrated measuring device (calliper, girthing tape, log measuring ruler, automatic system) which gives the diameter to an accuracy of at least one centimetre.

B.2.2 Measurement

B.2.2.1 Place of measurement

The diameter at mid length shall be measured.

If at the mid length there is an obvious shape defect which would cause a measurement to be false, measure at two points on either side of and equidistant from mid length. The arithmetic mean applies.

Depending on conditions, alternatively measure the diameter at the top end.

In case of top end measure, determine and note the taper coefficient, or use the coefficient in use in the supplying country. Then derive the mid diameter equivalent.

B.2.2.2 Bark allowance

The diameter under bark shall be measured.

In case of over bark measure, convert to a diameter under bark by using one of the three following methods:

- a) Reduce the measurement by twice the estimated thickness of the bark at the point of measurement. Where there are doubts about the thickness, determine this at the position of diameter measurement.
- b) Use a bark allowance stated in writing and agreed between buyer and seller.
- c) Failing agreement use an appropriate bark allowance given in bark thickness tables or grading rules published in the supplying country.

Allow over bark measurement as an alternative method.

B.2.3 Method of measurement

When using callipers, adopt the following procedure:

- a) For round timber of diameter estimated as not exceeding 19 cm, measure once by positioning the callipers such that the diameter measured is the mean diameter.

NOTE 1 If the round timber is considered to be oval, then two diameter measurements perpendicular to each other may be taken.

b) For round timber of diameter estimated as 20 cm or more, measure two diameters perpendicular to each other.

NOTE 2 If the round timber is considered to be circular, then one measurement only may be taken.

When using a girthing tape, take a single measurement.

B.2.4 Recording of results

When a single measurement of the diameter is taken, express the result in centimetres rounded down to the nearest centimetre.

When two measurements of the diameter are taken, express each result in centimetres rounded down to the nearest centimetre. Calculate the arithmetic mean of the two measurements and express in centimetres, rounded to the nearest centimetre, according to arithmetical rounding rule.

B.2.5 Determination of the volume

Calculate the volume of the round timber by using the formula:

$$V = (\pi / 4) \times d^2 \times l \times 10^{-4}$$

where

V is the volume in cubic metres to two or three places of decimal;

d is the mid diameter in centimetres, noted as defined in B.2;

l is the length in metres as noted in B.1;

π , shall be rounded to four places of decimal (3.1416).

If the round timber contains a stop, divide at the stop with a theoretical crosscut point into two portions, measure them separately, calculate their separate volumes and add the results.

If the round timber contains portions of differing quality, divide with theoretical crosscut points into the number of portions required, measure them separately, calculate their separate volumes and add the results. The seller shall state in writing the length of each portion and the volume of each expressed as a percentage of the total volume of the round timber.

The volume may be determined using volume tables that shall contain a full explanation of their construction.