Measurement of Roundwood Stacks

Swedish Regulations for Timber Measurement

Version 2020-10-01

BIOMETRIA

Contents

1 Introduction

1.1 Swedish regulations for timber measurement – timber measurement legislation

Swedish Regulations for Timber Measurement are adopted by the Biometria Board on the basis of recommendations from RMR (Council for Measurement and Reporting). The documentation for RMR is prepared by the Biometria department for development and IT. In certain cases, the Swedish regulations are supplemented with business-related regulations.

Regulations and instructions concerning checks and follow-up are briefly described in each measurement regulations document and in separate documents. Current versions of measurement regulations and measurement inspection documents can be retrieved from www.biometria.se.

Timber measurement in Sweden is regulated by special legislation, the Swedish Timber Measurement Act. This Act and the regulations of the Swedish Forest Agency (SKSFS 2014:11) on timber measurement form a fundamental regulatory framework for timber measurement and timber reporting in Sweden. The regulations include requirements for accuracy when measuring stacks. The requirements concern gross volume.

- Systematic errors: only insignificant systematic errors are allowed in measurement.
- Batchwise deviation: for timber batches greater than 10 m³ the maximum permitted deviation is stated as a function of the batch size. As the batch size increases, the permitted deviation decreases. A batch of timber is defined as follows: *A clearly defined quantity of timber agreed by the seller and buyer that is measured using the same method. The specifications regarding timber properties are identical for the entire quantity. The timber is usually delivered on a single occasion or within a short interval of time.*

1.2 Scope and application of these regulations

Stack measurement is used for roundwood and gives a volume in cubic metres solid under bark (m^3sub). The measurement concerns form-adjusted solid volume, i.e. deduction is made for any bulging. This volume should correspond to the volume obtained in top-butt measurement of logs (see SDC Regulations, Measurement of Log Volume Under Bark).

These regulations are suitable for measurement of roundwood to form the basis of pricing, regardless of species, assortment, or intended use. The timber may be in fixed lengths or in varying lengths between 2.5 and 6.5 m. The regulations apply to measurement of timber loaded on vehicles and to measurement of stacks at a storage site. Provisions relating to quality are described in assortment-specific documents.

1.3 Basic requirements for stack measurement – delivery check

The timber must be measured accurately and according to the regulations applicable to the measurement. If local conditions do not allow the measurement to be carried out in this way, the timber must not be measured. The timber must be measured as seen.

The delivery check of timber loaded on a vehicle includes an examination of whether the conditions for measurement, e.g. confirmed identity, correspond with applicable regulations

and agreements. If this is not the case, measurement is refused. When the timber is to be measured on the vehicle, measurement may also be refused on work environment grounds, e.g. the way the timber is loaded or the presence of contaminants, such as stones.

If measurement is refused, both seller and buyer of the timber are to be informed immediately and notified of the reason for the refusal.

2 Stack dimensions and wood volume percentage

The wood volume under bark of the stack is calculated using its dimensions and the wood volume percentage. The stack dimensions, i.e. *height*, *stack length/bank width*, and *wood length*, are given in cm, rounded off according to Swedish Standard. The wood volume percentage is the proportion of wood in the volume of the imaginary rectangular box. The timber volume is the product of the stack dimensions and the wood volume percentage. The timber volume is calculated in cubic metres (m^3sub), to at least two decimal places.

Height: The height of the stack is the distance between a horizontal bottom surface and an average of the highest points of the top layer of logs.

Stack length/bank width: The length of a stack is the distance between the end supports/banks (or imaginary supports/banks). When stacks are measured at a storage site, stack length is used. When stacks are measured on vehicles, bank width is used.

Wood length: For timber in varying lengths, and fibre and energy assortments in standard lengths, the wood length of the stack is the basal area-weighted average length[1] that would be obtained through log-by-log measurement.

For assortments in fixed lengths suitable for sawing, the agreed wood length applies as measurement. The excess timber normally found in stacks is not included when calculating the stack volume.

Wood volume percentage: The wood volume percentage of a stack is determined and expressed as a whole-figure percentage. The wood volume percentage mainly depends on the following properties. (*Tables for use in visual assessment can be found in Appendix 1.*)

Stack properties	Log properties
- Stacking	- Mean diameter
- Logging waste, and snow and ice	- Crookedness
- Position of the logs in the stack	- Delimbing (incl. buttress)
- Stack height	- Wood length
- Proportion of butt logs	- Stem form / tapering
- Species mix	- Bark volume

[1] The basal area-weighted average length is calculated by adding, for each log, the product of its length and area (basal area) in a plane through the centre of the stack. The total obtained is then divided by the total of the logs' areas (basal areas). This means the log length is 'weighted', with the areas of the logs as weights. In turn, this means that thicker logs affect the calculated average length more than thinner logs.

2.1 Stack volume divided by tree species, dimension classes, or assortment

The volume of a stack may be divided by tree species, dimension classes, or assortment. The relative proportions are shown as percentages (whole number).

3 Stack measurement on a vehicle

3.1 Measurement on a vehicle

When a stack is measured on a vehicle, dimensions are measured according to Figure 1. In stack measurement, the wood length and the stack height are usually measured on the basis of one of the sides of the stack. Height and upper bank width should be measured at each of the stakes round the stack, after which an average is calculated.

One basic requirement in stack measurement is that the distance between stacks or to the front edge must be at least 30 cm. If this is not possible, there should still be a clear gap. If individual logs must overlap, these should not be placed at the outer edges of the stack (i.e. against the stakes or in the top layers). If the stack cannot be measured with sufficient reliability, reloading may be required.

From Figure 1, it can be seen that the lower bank width is difficult to measure when the vehicle is loaded. This dimension must therefore be pre-measured and displayed on the vehicle or must be made available in some other way to the scaler (measuring official). The measured/displayed lower bank width is adjusted on the basis of measured or estimated upper bank width measurement, and any bulging of the stakes is taken into account.

When measuring a (part-)stack of thick pulpwood (Assortment 18), comprising one or a few logs, the stack dimensions may be calculated using a simplified log measurement (see Appendix 4).

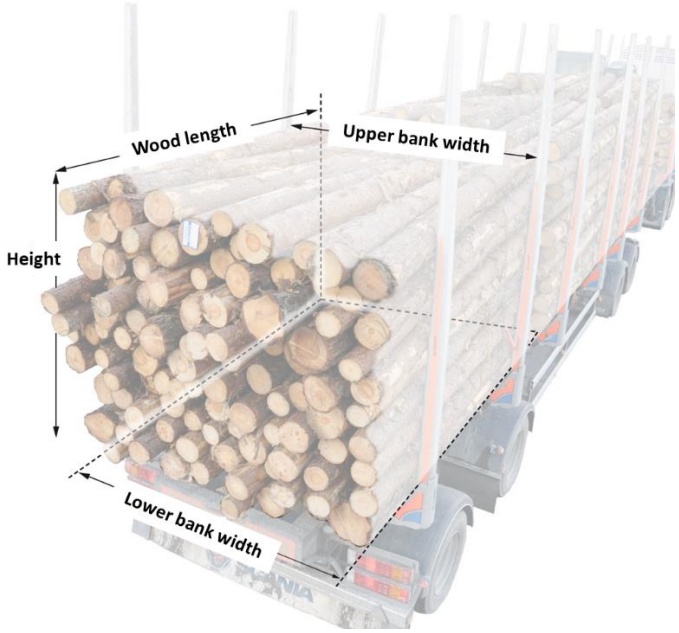


Figure 1. Measurement of stack on a vehicle.

3.2 Measurement of lower bank width

When measuring lower bank width, a calibrated measuring device must be used. The measurement point is the lowest point on the stake pair, but the measurement must not be affected by any reinforcements (see Figure 2). The internal distance between the stake pairs is measured. The average width between all stakes on the truck and trailer respectively is then recorded. The dimensions must be checked by Biometria personnel at least every third year. They must also be checked after new manufacture or repairs to the stakes. The dimensions must be stated on labels on each vehicle. The format for this labelling is described in Appendix 2.

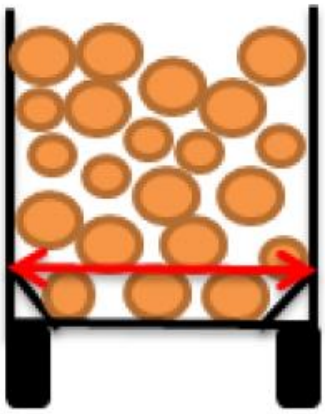


Figure 2. Measurement point for measuring lower bank width.

3.3 Co-loads, split stack on a vehicle

A vehicle may be loaded with several consignments, i.e. loaded wood is from different batches, providing they are kept clearly apart. The procedure is described below.

If a stack or a part-stack does not have at least one end surface accessible for inspection, there must be an adjacent stack from the same consignment where the end surface can be inspected. This applies to, for example, the stack closest to the cab and the middle stack on a trailer with five stacks of standard lengths. The properties of the adjacent stack (wood volume percentage, quality, etc.) may then be allocated to the non-accessible stack. However, it is primarily the properties of the enclosed stack that are to be assessed.

Split stack on a vehicle
A stack on a vehicle may be divided into several consignments on condition that:

- An individual part of a stack is at least 20 cm high. (Exception for cases where the stack height is calculated according to Appendix 4).
- The boundary between part-stacks is shown using an insert or some other clear marking. An insert may comprise firmly supported thinner logs or large branches. In marking, the top layer in the underlying part-stack must be marked, for example with marking dye. Consignments must be marked in conjunction with loading.
- If the part-stacks are of the same assortment, there is a maximum of three part-stacks in the same stack. If the part-stacks are of different assortments, the

maximum is two part-stacks. Assortment concerns tree species (coniferous, spruce, deciduous, etc.)
- Part-stacks of thick pulpwood (Assortment 18) must lie at the top of the stack to enable them to be kept apart during unloading.

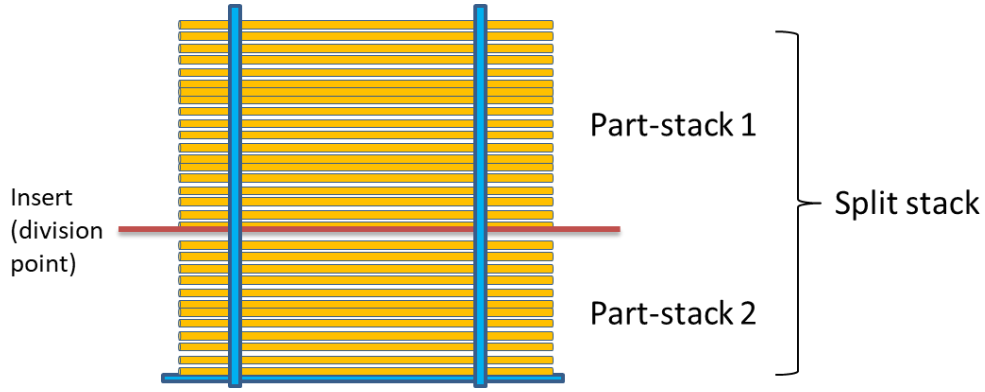


Figure 3. Stack and part-stack.

4 Stack measurement at a storage site

A storage site may be a road, harbour, terminal, etc.

4.1 Requirements regarding how the timber is stacked

For stack measurement at a storage site, the following conditions apply:
- The stack height must be at least 100 cm and no higher than 300 cm.
- The top of the stack must be satisfactorily levelled.
- Stacks containing timber of standard length must be drawn level at the ends. This means that no end surface of an individual log may deviate more than 20 cm from the average end surface of the stack.
- Stacks containing timber of varying lengths must be arranged with the logs at one end drawn level, so that no log end deviates more than 40 cm from the average end surface of the stack.
- Stacks with timber of varying lengths may not exceed 600 cm in length.
- Space must be available on both sides of the stack to allow examination of the contents. On one of the stack sides (the most evenly drawn side where the stack contains varying lengths) there must be sufficient room for measurement to take place (at least 5 m).
- Before measurement, the top of the stack must be cleared of sufficient snow, ice, and logging waste to allow measurement of the timber. Only a limited amount of logging waste may occur inside the stack.
- Stacks must be at least 1 m apart.

4.2 Section measurement of a stack

If the stack exceeds 300 cm in length, section measurement must be used for wood length and height. The stack is then divided into a number of equal-length sections, no longer than 300 cm. When measuring wood length, one measurement is taken for each section. When measuring stack height, one measurement is taken at both log-end sides of each section, and the average is given as the height of the stack.

If merchantable logs belonging to the batch are used as foundation under the stack, these are included in the stack volume. The volume of these logs may be estimated.

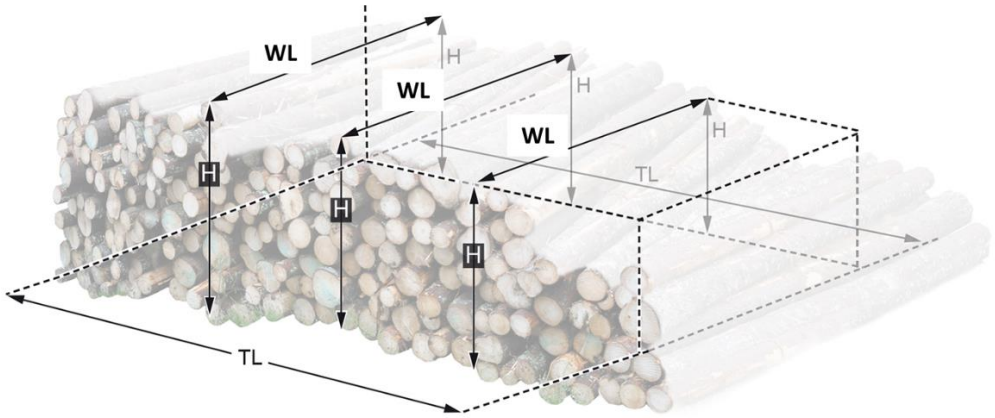


Figure 4. Section measurement of a stack with logs of standard length. SL = stack length, H = stack height, WL = wood length.

Stacks without end supports normally have sloping sides. In order to obtain a suitable stack length measurement, an 'imaginary' volume transfer of the outer part is made. This procedure, known as 'folding up', is permitted. More examples of section measuring of a stack on a storage site are shown in Appendix 3.

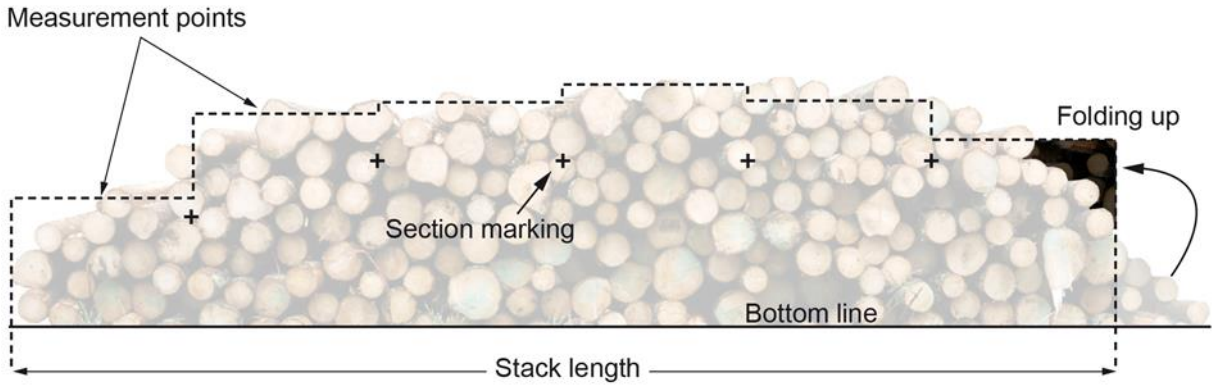


Figure 5. Section measurement and the principle of folding up.

5 Equipment for measuring stacks

5.1 Instruments for manual measurement of stack dimensions

Instruments for measuring bank width/stack length, wood length, and height must be approved according to Biometria's regulatory framework. The stack height must be measured using measuring equipment of at least the same length as the greatest height of the stack.

5.2 Stack measurement using photos

Stacks on a vehicle may be measured using photos. The photos must enable equivalent measurement, and equivalent opportunities to check measurements, to those applying to manual measurement on the vehicle. For the vehicle in question, the bank width must be registered, and the information must be available for the scaler.

The following apply when photos are used to measure a stack:

- A photo perpendicular to the stack to allow measurement of height and wood length.
- Function for calibration, e.g. clearly visible calibration object in the photo where the measurement is taken.
- At least one photo per stack, taken at an angle that allows as much as possible of the stack's end surface to be assessed.
- The possibility to zoom in so that the supplier's labelling can be read, and the quality assessed.

5.3 Equipment for automatic stack measurement on a vehicle

A stack on a vehicle may be measured using equipment for automatic measurement if this is type approved by VMK.

6 Checks of original measurements

Measurements must be checked on randomly selected measurement units (stacks). The measurement units must be complete stacks, i.e. part-stacks are excluded (see Section 3.3).

Checks of stack measurement on a vehicle must be performed as log measurement (top-butt measurement). Checks of stack measurement on a roadside may be performed as stack measurement, but preferably as log measurement (top-butt measurement). When the check measurement is performed as stack measurement, it must be performed as two-sided measurement with 1-m stack sections.

The result from the check measurement is expressed as the difference in stack volume between ordinary measurement and the check. The result is reported as mean values and intervals at the desired aggregation level (measurement site, time period, batch, etc).

7 Revision history

Date	Description
1 January 2014	The instructions may be applied in accordance with the decision of the SDC Board. The instructions are introduced after decisions made by each measuring company. The instructions replace the section *Volume measurement of stacks* in Measurement Instructions VMR 1-99.
1 January 2016	Additional text concerning 1) insert to divide stacks, 2) part-stack as a sample, and 3) part-stack as a control unit. Stack length changed to bank with for measurement on a vehicle.
1 August 2016	Change of title from *SDC Instructions* to *Swedish Instructions*.
1 January 2018	Log length changed to wood length. Section 2.1 added. Section 3.1: Text regarding one-/two-sided measurement removed. Changed description of bank width measurement.
1 January 2019	VMF Syd, VMF Qbera, VMF Nord and SDC merged to form Biometria
1 January 2020	Measurement Instruction and Application Guideline combined into one document. Appendix 4 added. Section 3.3: some changes to text. Section 3.3.1 removed. Chapter 6: Checks that are randomly assigned to a split-stack may be moved to an adjacent stack.
1 October 2020	Chapter 6: Split-stacks exempt from checks.

Appendices

Appendix 1 Table for assessing wood volume percentage in a stack

The following tables have been produced for training purposes and as an aid in measuring. The principle of the tables is that a base value is adjusted by values based on various log and stack properties. The final figure produced is the wood volume percentage of the stack. With greater experience, the scaler can assess the wood volume percentage of a stack through a 'general impression' and directly estimate the wood volume percentage.

Part 1. Tables

Base values for tree species.

Tree species	Base value	Comments
		1. If the stack contains more than one tree species, the base value is calculated by weighting the base value for the species with its estimated volume proportion (= weighted mean) 2. For assortments intended for pre-sawing, the base values are increased by 2% for deciduous trees and 1% for coniferous trees. For aspen intended for matchstick manufacture, the base value is increased by 2%. 3. When a stack is measured on a vehicle, the base value is reduced by 1% if the timber is tightly stacked up to the end support, otherwise by 2%.
Spruce	70%	
Pine	68%	
Aspen	66%	
Alder, Oak	65%	
Birch, Beech, Ash	64%	

Correction for the mean diameter of the timber (arithmetic mean diameter over bark)

cm	%	cm	%	cm	%	cm	%
4	-13	9	-6	15	0	23-26	+5
5	-11	10	-5	16	+1	27-39	+6
6	-9	11	-4	17	+2	40-69	+7
7	-8	12	-3	18-19	+3	70+	+8
8	-7	13	-2	20-22	+4		

Deduction for bark and stacking

Bark		Stacking	
Extremely thin bark	-4	Dense, very well-stacked	0
Thin bark (high proportion of shiny bark)	-5	Well-stacked	-1

Normal bark	-6 to -8	Rather loosely stacked	-2
Thick bark (high proportion of crusty bark)	-9	Loosely stacked, slightly lopsided (normal mechanical stacking)	-3 to -5
Extremely thick bark	-10 to -12	Very loosely stacked, very lopsided	-6 to -7
		Extremely loosely stacked, extremely lopsided	-8 to -9

Deduction for crookedness and delimbing

Crookedness		**Delimbing (incl. buttress)**	
Straight	0	Individual short delimbing stumps on a few logs, otherwise delimbed to the mantle surface. Negligible knot bulges and one or two buttresses	0
Almost straight	-1	Many short delimbing stumps, marked branch whorls, a small number of buttresses	-1
Somewhat crooked	-2	Significant number of branch stumps and buttresses, noticeable branch whorls with branch swellings	-2 to -3
Crooked	-3 to -4	Large number of branch stumps, large branch whorls and several large buttresses. Partly coarsely branched	-4 to -5
Quite crooked	-5	Thick branches and/or very poor preparation	-6 to -8
Very crooked	-6		
Extremely crooked (branch wood)	-7		

For stacks with timber of a mean diameter of 7 cm and less, the deduction is doubled. For diameters 8-9 cm the deduction is adjusted.

Correction for stem form/tapering

Logs with good stem form (negligible tapering, even and smooth mantle surface)		**Logs with poor stem form (considerable tapering and knobbly mantle surface)**	
Volume proportion 31-50%	+ 1%	Volume proportion 31-50%	- 1%
Volume proportion 51-70%	+ 2%	Volume proportion 51-70%	- 2%
Volume proportion 71% and more	+ 3%	Volume proportion 71% and more	- 3%

Deduction for snow and ice, and logging waste

Soft snow, solid snow, ice in the stack		**Logging waste in the stack**	
Small amount	-2	None or negligible amount	0
Large amount	-4	Limited amount	-1
Substantial amount	-8	Substantial amount	-2
Extremely substantial amount	-12	Very substantial amount	-3 to -4

Logging waste includes stem wood shorter than 150 cm, chips from splints, etc, bark, branches, and brushwood.

Correction for wood length and stack height

Wood length (only standard length)			**Stack height**	
	Coniferous	**Deciduous**		
4.0 m	- 2	- 3	Stack exceeding 2 metres on 2/3 of the length of the bottom layer	+ 1
3.0 m	0	0		
2.5 m	+ 1	+ 2	Stack exceeding 3 metres on 2/3 of the length of the bottom layer	+ 2
2.0 m	+ 3	+ 4		

Part 2. Comments and explanations

Table: Correction for the mean diameter of the timber (arithmetic mean diameter over bark)

Important in this context is the relationship between the diameter of an individual log and its mantle surface, and between its diameter and its volume. Consequently, there is also a relationship between log diameter and mantle area per volume unit. The principle of this relationship is shown in Figure 6.

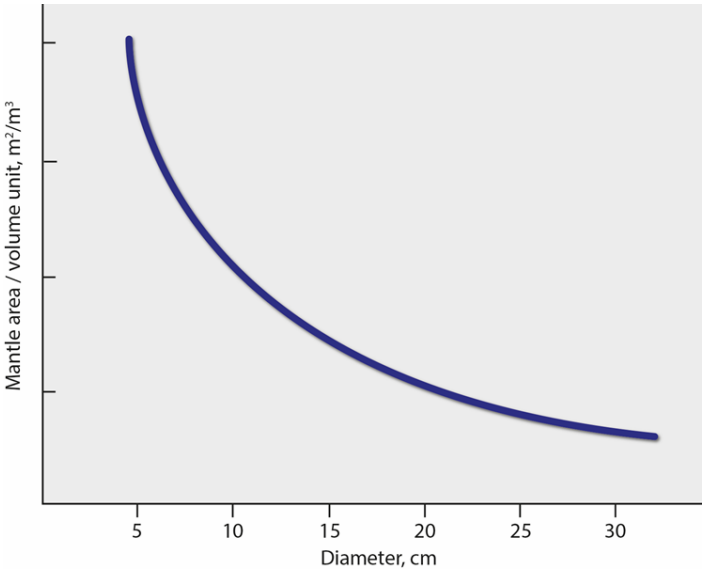


Figure 6. Relationship between log diameter and mantle area per volume unit.

One consequence of the relationship shown in the diagram is that the total mantle area of the logs in a stack of thin logs is greater than the total mantle area of thicker logs in a stack that otherwise contains the same volume. The greater mantle area also means more points of contact between the logs. If these points of contact are branch stumps or branch knots, it is clear that the wood volume percentage in a stack of thin logs will be lower than in a stack of thicker logs, even if the degree of delimbing in both cases is the same. At a certain thickness of, for example, ice-covered bark, for the same reason the wood volume percentage in a stack of thin logs is affected more negatively than in a stack of thicker logs.

Because the stack density is affected by many properties, directly or indirectly related to the total mantle area of the logs in a stack, in practice the diameter is an important factor in determining the wood volume percentage. It is also the relationship between the diameter and other properties that the correction figure for the factor 'mean diameter' takes into account.

The diagram of area per volume unit shows that the area is strongly reduced as diameter increases up to 20-25 cm, but the curve then flattens out. This relationship is also taken into account in the guidance table. The correction figure in the table increases up to a diameter of 26-27 cm, but after that remains unchanged. Special attention must be paid in assessment of wood volume percentage when the stack contains logs with a very small or very large mean diameter.

Table: Deduction for bark and stacking

The 'stacking' factor refers to the density in the stack, which depends on the respective positions of the logs in the stack. The appearance and form of the individual logs have nothing to do with stacking. Signs of poor stacking are that the logs are not placed straight or that they are not placed sufficiently closely to the stakes on the vehicle.

In theory, round, evenly-thick (cylindrical) logs of a certain diameter can never be stacked in a way that prevents 10-20% air being left between them. Depending on how the logs are stacked, the wood volume percentages can be obtained as shown in Figure 7.

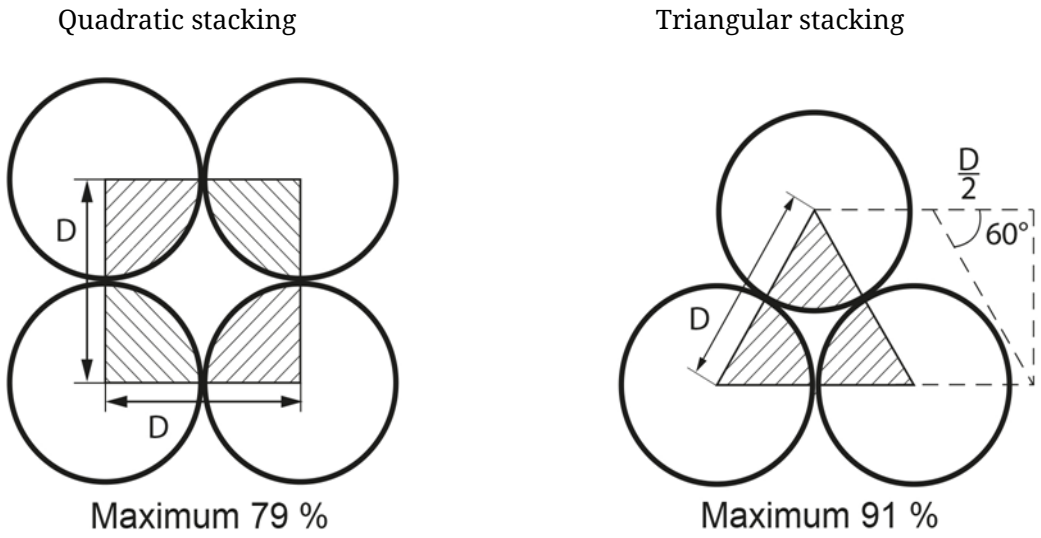


Figure 7. Wood volume percentages in quadratic and triangular stacking.

In practice, quadratic or triangular stacking is never possible, and finding logs with exactly the same diameter in stacks is very uncommon. The log diameter and form usually vary, and together with other properties, this means that the wood volume percentage is never higher than 79%.

Table: Deduction for crookedness and delimbing

The 'crookedness' factor refers to the crookedness in the timber that reduces the density in the stack, because crooked logs cannot normally be placed immediately adjacent to each other. In the assessment, consideration must be taken only to the effect of the crookedness on the density in the stack.

Table: Correction for stem form/tapering

This factor refers to the influence of the stem form on the wood volume percentage. In particular, buttress logs are characterised by distinct tapering, to which the bulge of the buttress naturally contributes. The stem form of a buttress log corresponds to the shape of a neiloid. As shown in Figure 8, this tapering is not constant throughout the length of the log, increasing towards the buttress end. The contours of the mantle surface are therefore curved. A high proportion of buttress roots therefore reduces the relative wood volume of the stack. This tendency is particularly clear for timber of standard length where the log ends have been drawn to form an even end surface. Where the situation is reversed, it is important that the protruding buttress ends do not increase the stack volume.

Figure 8. Log with neiloid shape.

The described log with the neiloid shape is bucked from the buttress end of a tree, giving the stem form as shown in Figure 9.

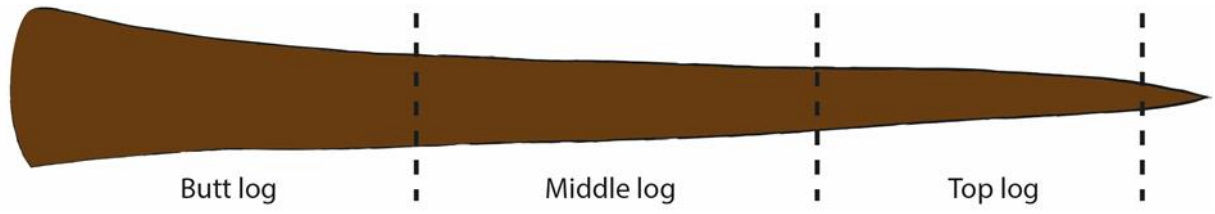


Figure 9. Sketch of the stem form.

The tree stem can be roughly divided into a buttress part, a middle part, and a top part. The stem part nearest the butt cut normally is normally enlarged, so the buttress log has quite severe tapering (= poor stem form). The size of the enlargement, and the stem form generally, varies between different tree species and between individuals of the same species.

The middle part of the stem, the mid-log, generally has little tapering. Consequently, a large proportion of middle logs can significantly increase the wood volume percentage, which must be taken into account when assessing wood volume under the factor ‘stem form’.

The top part of a tree stem generally has quite severe tapering. Unlike the neiloid-shaped buttress log, the top log has an increasing taper towards the top end, which gives the log a paraboloid shape (Figure 10).

Figure 10. Log with paraboloid form.

The factor ‘log position in the stack’ is lacking in the assessment tables. However, it is important in practical measurement to consider the effect on a stack’s wood volume percentage of both the individual logs’ positions in the stack and their diameter distribution. The density of the stack increases considerably with greater variation in log diameters. This effect can be explained by the greater space between thick logs that can be filled with thin logs.

Studies have shown that a greater variety of diameters can increase the stack density by 4 percentage points. The wood volume table does not indicate such a large range in variation

as 4 percentage points but, because the table is intended for use as a guide to assessing the wood volume percentage, a greater correction may be made than that shown in the table. An example is when assessing the wood volume percentage in a timber stack with a wide range of diameters.

Table: Deduction for snow and ice, and logging waste

The use of the factor 'snow and ice' depends mostly on the climatic conditions in the geographical area where the measurement is taking place. Consequently, it might be thought that the factor should be considered for more months of the year in northern Sweden than in the southern parts of the country.

However, in certain cases, the problems caused by snow and ice may be perceived as greater in the southern parts of the country than in the north. The explanation could be that the experiences of snow and ice in general are limited, that the temperature in this area often varies around zero degrees, resulting in crisp snow or ice formation. In these conditions, the wood volume percentage will be greater than if the snow is constantly cold and loose.

Appendix 2. Labelling of bank width on a vehicle

After measurement and recording in the measurement site documentation, the bank width of the truck and trailer are recorded on special adhesive labels that must be available at every measurement site. In the example below, the figure 34 means that the bank width has been measured to be 234 cm. For reasons of space, only the final two figures are shown If there is not enough room for the figures to be displayed horizontally, they may be placed vertically, with the tens figure highest. The labels are to be placed visibly on the lower part of the stakes behind the final bank on the vehicle, and on the front and back of the first and last bank on the trailer

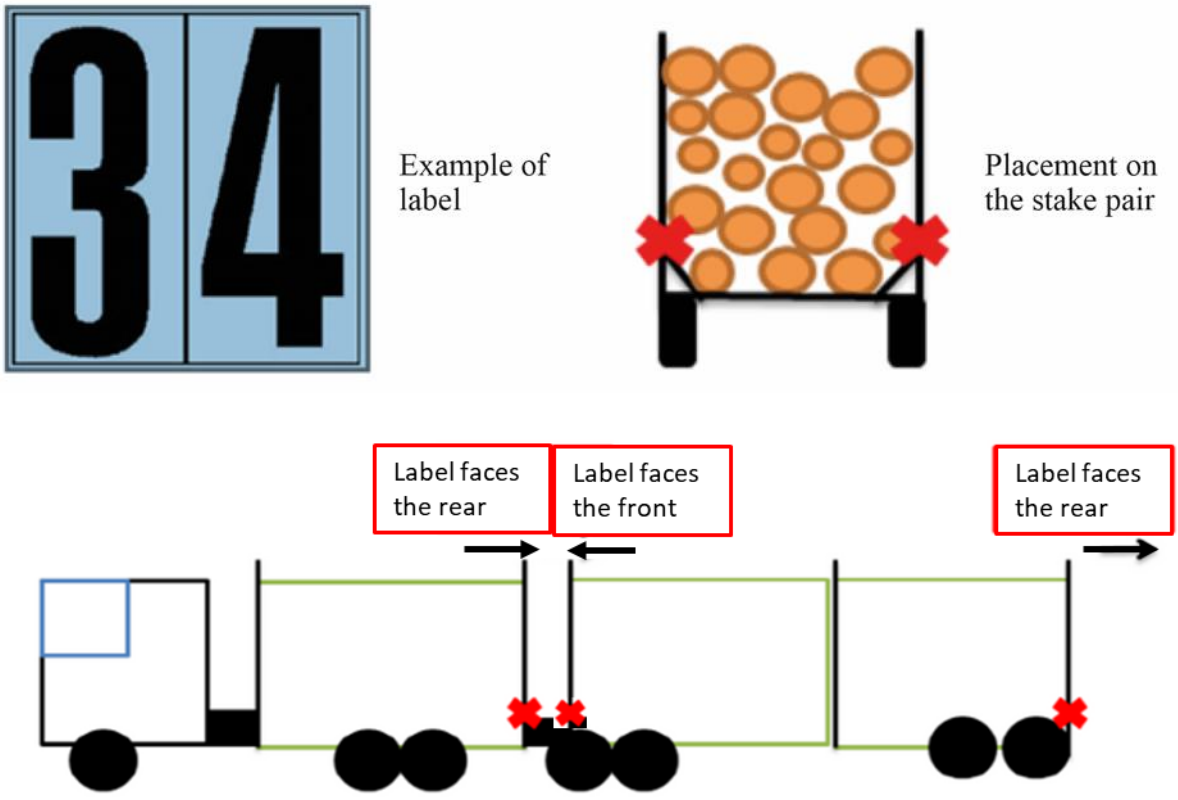


Figure 11. Examples of labels for marking the lower bank width, and how they should be placed on the vehicle and trailer. Before the labels are applied, the surface should first be cleaned thoroughly to ensure that that the labels adhere properly and remain in place.

Appendix 3 Section measurement of a stack on a storage site

Measurement of a crooked stack

The length of a crooked stack is measured with the instrument as close as possible to the stack. The length of the stack comprises the average of the lengths of each side.

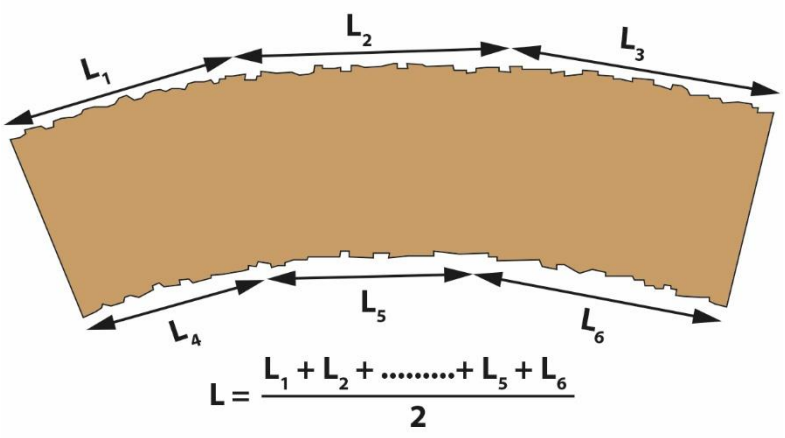


Figure 12. Measuring the length of a crooked stack.

7.1.1.1 Examples of section measurement

The volume of a stack is calculated as described in the following example. Assume that we have a stack with the measurements shown in Figure 13.

Section	Stack length	Wood length	Stack height, cm	
	cm	cm	Front	Back
1	100	303	54	37
2	100	301	139	119
3	100	299	134	135
4	100	302	137	148
5	100	300	101	111
6	100	303	83	93
Mean (rounded)	600	301.3 (301)	107.6 (108)	

The product of the external measurements of the stack is the cubic metre stack volume (m^3t), but m^3t is not a measurement unit that can form the basis of pricing. In the example, the stack volume is calculated as follows:

$$6.00 \times 3.01 \times 1.08 = 19.505\ m^3t$$

With an assumed wood volume percentage of 55%, the wood volume under bark, m^3sub, is:

$$19.50480 \times 0.55 = 10.72764 = 10.73\ m^3sub$$

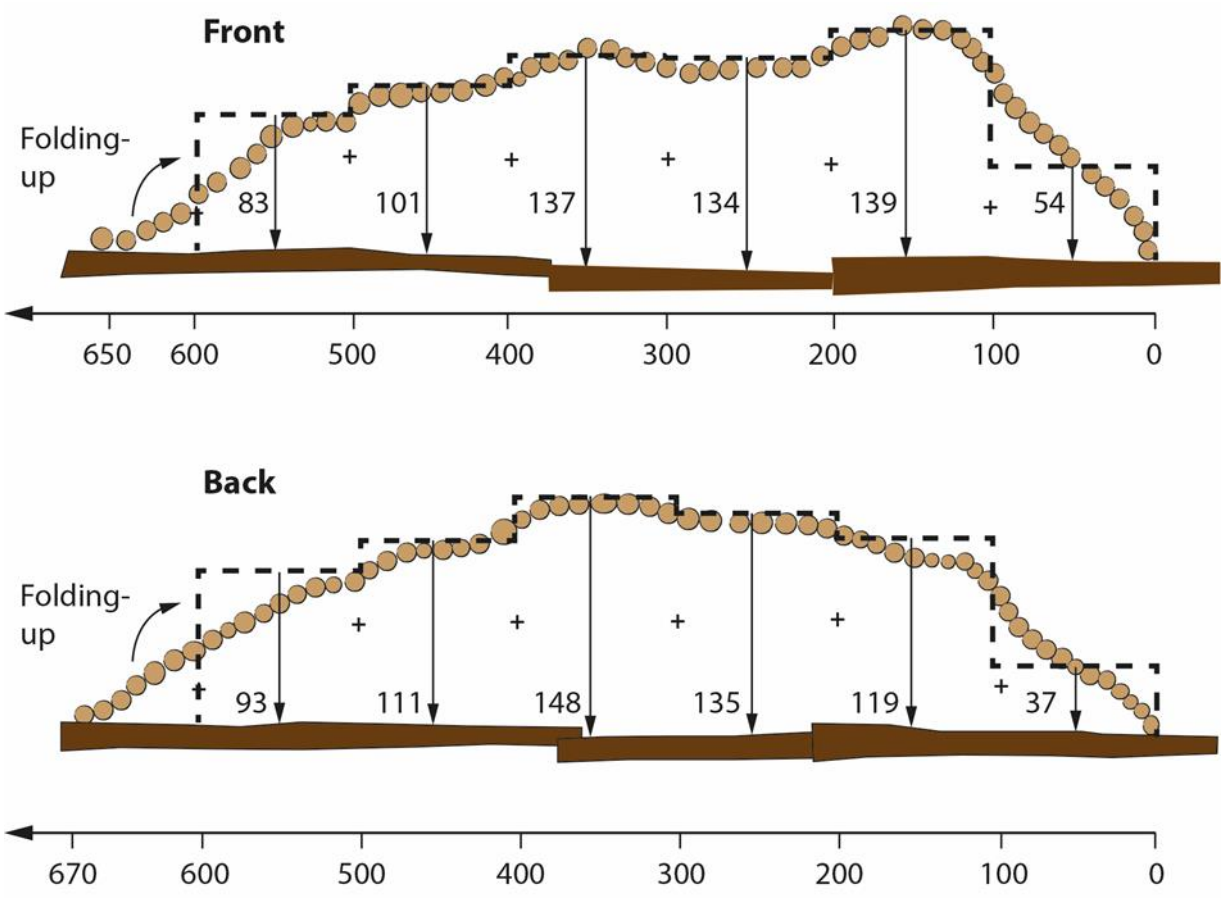


Figure 13. Section measurement of a stack.

Appendix 4. Measurement of (part-)stack comprising a few very thick logs

When measuring a (part-)stack of thick pulpwood (Assortment 18), comprising one or a few logs, the stack measurement may be based on a simplified form of log measurement. This log measurement is converted to a stack measurement using Table 1. The measurement procedure is as follows:

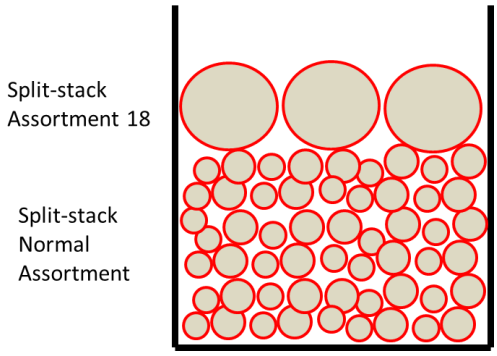
1. The mid-point diameters of the thick logs are assessed
2. The stack height for these diameters is obtained from the table
3. Bank width is 230 cm, wood percentage volume 75%
4. Wood length = basal area-weighted average length of the thick logs

Part-stacks of Assortment 18 must lie at the top of the stack so that they can be kept apart during unloading. They must be marked according to the same method as other (part-)stacks on the vehicle.

Table 1. Calculation of stack height for (part-)stack comprising a few very thick logs.

Mid-point	Number of logs			
diameter of log	1	2	3	4
cm	"Stack height" cm			
60	16	33	49	66
70	22	45	67	89
80	29	58	87	117
90	37	74	111	148
100	46	91	137	182
110	55	110	165	220
120	66	131	197	262

Example with two thick logs



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70	22	45	67	89
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90	37	74	111	148
100	46	91	137	182
110	55	110	165	220
120	66	131	197	262

Stack height 22 + 37 cm = 59 cm
(bank width 230 cm, wood volume percentage 75%)

Swedish Regulations for Timber Measurement are adopted by the Biometria Board on the basis of recommendations from RMR (Council for Measurement and Reporting). The documentation for RMR is prepared by the Biometria department for development and IT.

The regulations are published on www.biometria.se.

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