Grading of Pulpwood in the Baltic States

Based on Swedish Instructions for Timber Measurement

2025-04-01

These instructions include grading of stacks as Prima or Sekunda class. VMF Estonia and VMF Latvia do not currently use the Prima or Sekunda classification system when grading stacks.

BIOMETRIA

Contents

1 Introduction

1.1 Swedish instructions and legislation regarding timber measurement

Instructions for timber measurement in Sweden are adopted by the Biometria Board on the basis of recommendations from RMR (Council for Measurement and Reporting). The documents for RMR are prepared by the Biometria department for strategic development. In certain cases, the instructions are supplemented with business-related provisions.

Rules and regulations concerning checks and follow-up are briefly described in each Measurement Instructions document and in more detail in separate documents. Current versions of measurement instructions and control documents can be retrieved from www.biometria.se, including this measurement instruction, adapted by Biometria for use by authorised measuring companies in the Baltic States.

Timber measurement in Sweden is regulated by special legislation, the Swedish Timber Measurement Act. This Act and the regulations of the Swedish Forest Agency regarding timber measurement form a fundamental regulatory framework for timber measurement and timber reporting in Sweden.

1.2 Scope and application of these instructions

These instructions apply when grading pulpwood, where the grading will form the basis of payment in a commercial transaction. Pulpwood is roundwood intended for the production of pulp. This document only relates to the assessment of quality (grading). Pulpwood may be traded without grading. Regulations concerning the measurement of quantity are found in other instruction documents, such as *Measurement of log volume under bark* and *Measurement of roundwood stacks*. The main measurement unit for quantity of pulpwood is solid volume under bark (m^3sub).

The measurement process consists of two parts: delivery check and grading. These can be performed simultaneously, or at different times and locations. The latter may be the case for remote measurement based on photos of the consignment.

When the quality of logs is assessed, this involves dividing the logs into merchantable and non-merchantable, and estimating the percentage of forest rot in the log ends. Stacks are graded into Prima (Grade 1) and Sekunda (Grade 2) classes. When the quality of logs is assessed as log-by-log measurement, detailed regulations regarding quality can be closely observed. However, when stacks are measured or graded, only a small proportion of the logs are visible, and properties such as log-length, delimbing, etc. are difficult to determine with any great accuracy.

The quality of pulpwood refers to its suitability for pulp manufacture. Pulpwood manufacture can be said to start in the forest, so quality can be affected by all operations after cutting, including transport, measurement, and processing. It must be possible to transport the wood cost-effectively and safely, measure the wood with the applicable methods, and debark and chip the wood at the mills. All these are quality aspects that the regulatory framework must consider.

Addition concerning measurement done by VMF Estonia and VMF Latvia
VMF Estonia and VMF Latvia do not grade stacks according to the Prima or Sekunda classification system. Instead the proportion of non-merchantable logs, based on rules described in Chapter 2, and the rot volume, based on conversion figures in Chapter 5, is determined for each stack.

1.3 Basic requirements for measurement – delivery check

On delivery, the consignment is checked to ensure that the requirements for measurement, e.g. confirmed identity and separate batches, correspond with applicable instructions and agreements.

In addition, the wood is checked for merchantability, i.e. that it satisfies assortment requirements. In accordance with Chapter 3, stacks that do not fulfil the requirements for grading as Sekunda are not merchantable, unless agreed otherwise. The delivery check detects obvious errors and defects, such as wrong assortment, proportion of wrong tree species/dry logs, rot far exceeding permitted limits, large stones, metal objects, etc. On agreement, non-merchantable stacks can be recorded as a different assortment, assuming that the requirements for this assortment are satisfied.

If the regulations are not fulfilled measurement is refused. If measurement is refused, both seller and buyer of the timber concerned are to be informed immediately, and notified of the reason for the refusal.

If the consignment is suspected to contain toxins or radioactivity, a report is submitted to the buyer for the batch to be investigated.

1.4 Assortment – constituent tree species (group)

An assortment may be based on either species or handling or property-related classes.

Examples of assortments and the constituent tree species are given below. Pulpwood logs must be of an approved species. An assortment, such as hardwood pulpwood, may be subdivided according to tree species or species groups. This division means that stack grading includes an assessment of the proportion of each species or species group by volume. Other grounds for assessing proportions may be applied. If assessment of proportions affects pricing, this must be followed up in the check grading, see Chapter 6.

Assortment/species	**Approved species**
Spruce pulpwood	Spruce (*Picea abies*)
Softwood pulpwood	All softwoods
Lodgepole pulpwood	Lodgepole pine (*Pinus contorta*)
Birch pulpwood	Birch *(Betula pubescens* and *Betula pendula)*
Aspen pulpwood	Aspen and poplar
Beech pulpwood	Beech (*Fagus silvatica*), maple
Hardwood pulpwood	All hardwoods, except oak and elm
Mixed pulpwood	All species, except oak and elm

The following handling- or property-related assortment classes are used for pulpwood:

Assortment code	Classification/explanation
10	pulpwood of varying lengths
11	pulpwood with storage rot
12	pulpwood in standard length (2 m)
13	pulpwood in standard length (3 m)
14	pulpwood that is not fresh
15	pulpwood that is healthy, fresh
16	may include pulpwood suitable for sawing, special pulpwood
18	thick pulpwood
19	dry logs may be included

2 Quality requirements concerning merchantable logs

The following section describes quality requirements relating to individual logs. If the requirements are not met, the log is classed as non-merchantable. In Chapter 3, limits are given for grading of stacks into Prima and Sekunda grades, which is based on these log-related quality requirements.

2.1 Dimensions

Log length and diameter
Unless agreed otherwise, pulpwood logs must have the following minimum and maximum dimensions:

Diameter (under bark)	All pulpwood except thick pulpwood	Thick pulpwood
Minimum diameter	50 mm at minimum length	
Maximum diameter	700 mm	600 - 1250 mm

Log length

Minimum length:	Timber of standard lengths:	standard length - 30 cm
	Timber of varying lengths:	290 cm
Maximum length:	Timber of standard lengths:	standard length + 30 cm
	Timber of varying lengths:	580 cm

Maximum diameter is the largest individual measurement of log diameter. If the maximum diameter is exceeded, the log is recorded as overdimensioned.

In measurement of pulpwood, a log part with smaller diameter is regarded as tolerance. Log length is measured down to the agreed minimum diameter. Log length including log parts with smaller diameters may not exceed the agreed maximum length. Stemwood shorter than 150 cm or with a diameter < 50 mm at 150-cm length is recorded as logging residue, so it is neither measured nor recorded.

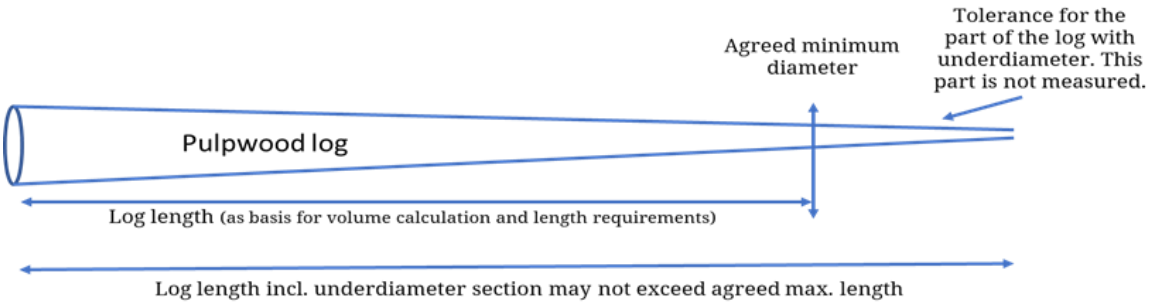


Figure 1. In measurement of pulpwood, a log part with underdiameter is called tolerance. Length including log parts with underdiameter may not exceed the agreed maximum length.

If a log has a fork, the length and top diameter are measured in relation to the thickest fork (i.e. the main stem). The length of the log inclusive of the longest fork limb may not exceed the agreed maximum length. However, if the log is cut in such a way that the length measurement based on the thickest fork limb is smaller than the minimum merchantable length, and the log has a longer limb, measurements of the log length and top diameter are instead based on the longer limb., i.e. not the thickest.

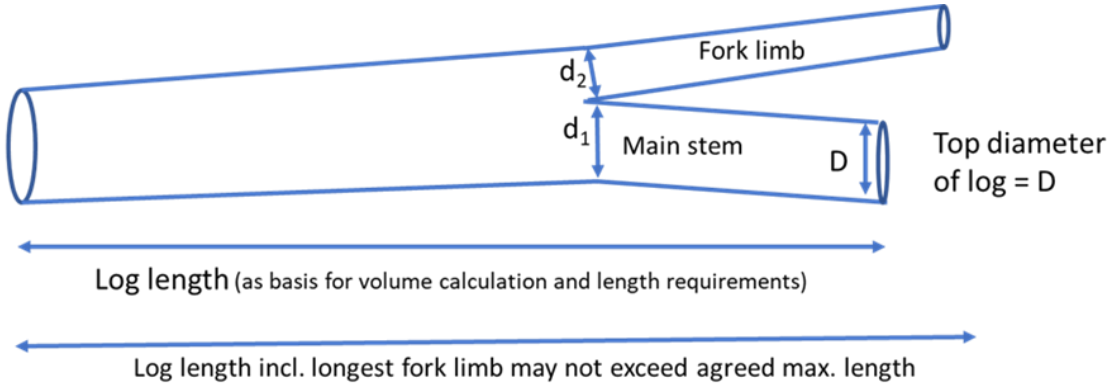


Figure 2. If a log has a fork, the length and top diameter are measured in relation to the thickest fork (i.e. the main stem). The length of the log inclusive of the longest fork limb may not exceed the agreed maximum length. However, if the log is cut in such a way that the length measurement based on the thickest fork limb is smaller than the minimum merchantable length, and the log has a longer limb, measurements of the log length and top diameter are instead based on the longer limb., i.e. not the thickest.

Buttress and other uneven sections

The largest diameter of a log under bark must not exceed the butt end diameter + 300 mm, or the maximum diameter 700 mm. The butt end diameter is measured 10 cm from the butt end, and 50 cm from the end for butt logs.

Exceptions are made for buttresses where cross-calliper measurement shows that the biggest diameter is at least three times bigger than the smallest diameter. In such cases the buttress is regarded as a delimbing fault, and not as the log's biggest diameter.

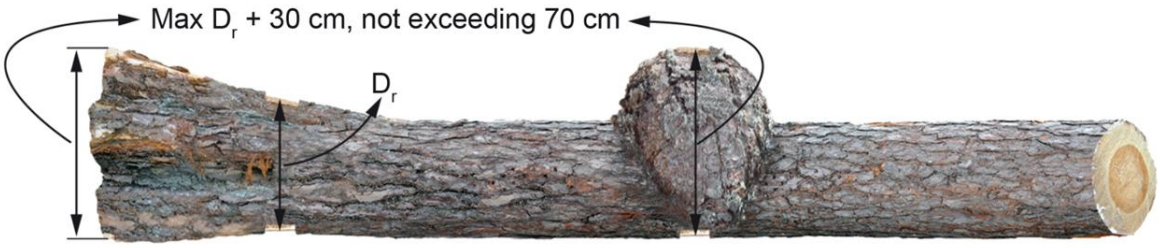


Figure 3. Remaining buttress or other uneven sections that make handling difficult must be sufficiently levelled off.

Width of crook
The width of a crook must not exceed the largest diameter of the log + 30 cm, nor the maximum diameter + 10 cm. Width of crook is defined as the diameter of the smallest imaginary cylinder, with a length equal to the log length, through which the log can pass.

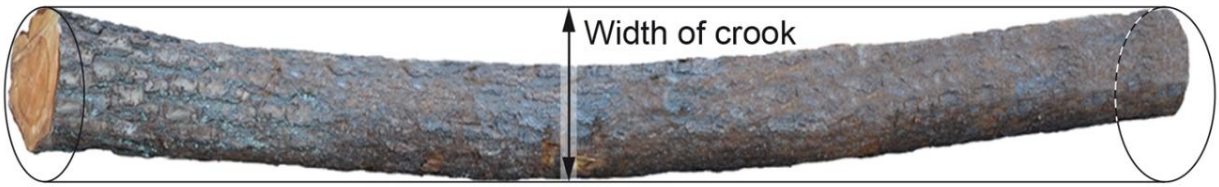


Figure 4. Measurement of width of crook.

2.2 Delimbing (branch stubs and forks)

Branch stubs remaining on the log, and forks, make transport and measurement difficult, and are difficult to process.

Length and diameter of branch stub/fork
Pulpwood logs must be satisfactorily delimbed, so branches and forks must be cut right up to, or close to, the mantle surface.

A fork is a log from a stem that has split into two. The diameter of the fork limb under bark must be at least 30 mm, and at least half the main stem's diameter under bark. If these conditions are not fulfilled, the thinner stem section is regarded as a branch. A fork is called an open fork if the main stem and the fork limb are completely separated and there is air between them. In other cases, the fork is a closed fork. Closed forks are permitted in pulpwood.

Open fork -air between fork limbs

Closed fork - bark between fork limbs

Figure 5. Open and closed forks respectively. Closed forks are permitted in pulpwood.

Branch stubs/open forks with a diameter ≤ 15 mm are tolerated. Thicker branch stubs/open forks are tolerated if their height is < 16 cm. Diameter is measured close to the mantle surface, perpendicular to the direction of the branch stub/fork. Height refers to the length of the branch stub/fork measured perpendicular to the log's length axis from the mantle surface under bark to the maximum height of the branch stub. If the branch extends beyond the length of the log, branch height is measured as the greatest height within the extent of the log. A broken part of a branch stub is not included. A branch stub is regarded as broken if its resistance when bending is less than that of an unbroken branch stub with a diameter of 15 mm under bark. For beech pulpwood, other limits may be agreed.

Any branch defects situated on underdimensioned log parts are ignored. Tolerance limits for branches and branch stubs may not be used deliberately and systematically.

Tolerance limits for attached branch stub/open fork	
Diameter under bark	**Height of branch stub/open fork**
- 15 mm	Unlimited
≥ 16 mm	< 16 cm

Figure 6. Measurement of height of branch stub and fork.

2.3 Forest rot

Forest rot is dark rot, soft rot and rot holes. Light solid rot and aniline wood, which is a first stage of forest rot, are not included. Forest rot is measured as a proportion of the surface area of the ends of the logs. In an individual log, an unlimited amount of forest rot is permitted. In log-by-log measurement, the proportion of rot is assessed in both ends. Rot diameter is expressed in mm, before the proportion of rot is calculated. When measuring net volume, rot area should be converted to a rot volume, see Chapter 5.

2.4 Storage decay

Pulpwood logs may not have storage decay. A log is regarded as having storage decay if it has more than 10% storage decay in a cross-section 15 cm from the log end. For pulpwood assortments other than spruce pulpwood, logs with 10-33% storage decay in the cross-section may, on agreement, be merchantable as 'storage decayed' and recorded with a special code.

On agreement, the number of storage-decayed logs in a measurement unit (stack, etc) may be assessed. A simple investigation can be carried out using an axe while the wood is still on the truck, by chopping into the logs that are accessible. However, for more detailed investigation of storage decay the wood must be unloaded and placed on a surface that permits cutting with a chainsaw.

Figure 7. Storage decay in spruce. Left: end surface of the log; Middle: a cross-section 15 cm from the log end; Right: Storage decay highlighted in black. Log diameter 20 cm, 25% storage rot (Rötskador i massaved, Swedish Forest Agency, 1989).

2.5 Dry logs

Pulpwood logs may not be dry. A log is classified as a dry log if the dryness has caused loss of bark. Dry logs usually originate from dead standing trees.

2.6 Freshness

Logs can be either fresh or not fresh, but freshness is not grounds for an individual log to be classed as non-merchantable. A log is regarded as fresh if the bark is easily removed, which is assessed using an axe or a knife on an undamaged part of the bark. The inner bark must be white and moist for the log to be classed as easily debarked. The logs may be inspected for freshness while they are loaded on the truck.

2.7 Foreign matter, 'dirty' logs

Pulpwood logs must not contain coal, soot, plastic, rubber, stones or metal. There must be no embedded gravel in the wood or bark. The fraction size of gravel is 2-20 mm and of stones > 20 mm. Logs may not be impregnated, painted, processed or used for other purposes for long periods. Processing does not include debarked timber.

Pulpwood logs must not be 'dirty', i.e. contaminated with inorganic material smaller than 2 mm. A log is classed as dirty if more than half the area of one end surface and more than half of the log length is contaminated.

3 Grading of stacks as Prima or Sekunda class

3.1 Introduction and grading table

As of March 2025, instructions in this chapter are not used by VMF Estonia and VMF Latvia for grading stacks as Prima or Sekunda but for conducting delivery checks as described in Section 1.3. The aim of the delivery check is to identify the stacks that do not fulfil at least the requirements for grading as Sekunda. These stacks are not merchantable, unless agreed otherwise. If the regulations are not fulfilled the stack delivered is refused.

A stack is wood loaded on a vehicle, trailer or railway truck, with side banks that give the stack straight sides. When grading a stack, visible parts are regarded as samples, the grading of which forms the basis for the stack being graded into Prima or Sekunda classes. A stack that has passed the delivery check, but in the subsequent grading is found to not fulfil the requirements for Sekunda class, is classed as Reject.

Grading of a stack assumes that the log grader can:

- see one long side of the stack and the log ends in at least one end of the stack.
- see the other side of the stack or the top surface to a certain extent.

These correspond to the normal conditions when measuring on a measuring platform or by using photos. If the stack or part-stack does not have at least one end surface accessible for inspection, an adjacent stack from the same consignment where the end can be inspected may be used. This applies, for example, to the stack closest to the cab and the middle stack on a transport rig containing five stacks of standard lengths. The properties of the adjacent stack (wood volume percentage, quality, etc.) may then be applied to the inaccessible stack. Primarily, though, it is the properties of the concealed stack that are to be assessed. All grading requirements are carefully checked through log-by-log measurements on randomly selected stacks.

Reason(s) why the stack is graded as Sekunda or Reject must be recorded. Any subdivision of the stack volume into different products, by for example tree species or species group, is not taken into account in the grading[1]. The entire stack is graded in the same quality class.

In this chapter, hardwood pulpwood refers to all assortments made up of deciduous trees. Softwood pulpwood also comprises mixed species pulpwood and lodgepole pulpwood unless stated otherwise.

Table 1 shows the requirements for grading a stack as Prima or Sekunda. Percentages relate to volume, except for forest rot, where the percentage relates to the end surface of the stack. Tables 2 and 3 should be used for “incorrect species, dry logs” and “branch stub, fork, dimensions”. These are based on counting the number of visibly incorrect or defective logs.

Table 1. Requirements for grading stacks into Prima and Sekunda quality classes. A stack that does not satisfy the requirements for Sekunda class may, on agreement, be classed as Reject.

[1] Stacks containing a mixture of permitted tree species are divided so that the total is 100%. Example: a stack of hardwood pulpwood where birch and aspen are permitted is assessed to contain 45% birch, 45% aspen and 10% alder. A stack is recorded as Reject on the grounds of incorrect species when the division is 50% birch and 50% aspen.

Reason	Prima			Sekunda		
	Spruce pulpwood	Softwood pulpwood	Hardwood pulpwood	Spruce pulpwood	Softwood pulpwood	Hardwood pulpwood
Incorrect species, dry logs	Max 1%	Max 1%	Max 1%	Max 2%	Max 5%	Max 2%
Forest rot (% of end surface of stack)	Max 2%	Max 5%	Max 5%	Max 2%	Max 25%	Max 25%
Branch stub, fork, dimension (excl. overdimensioned)	Spruce and coniferous pulpwood max 10% Lodgepole and deciduous pulpwood max 20%					
Overdimensioned	Not permitted					
'Dirty' logs	Max 5 %					
Foreign matter	Not permitted					

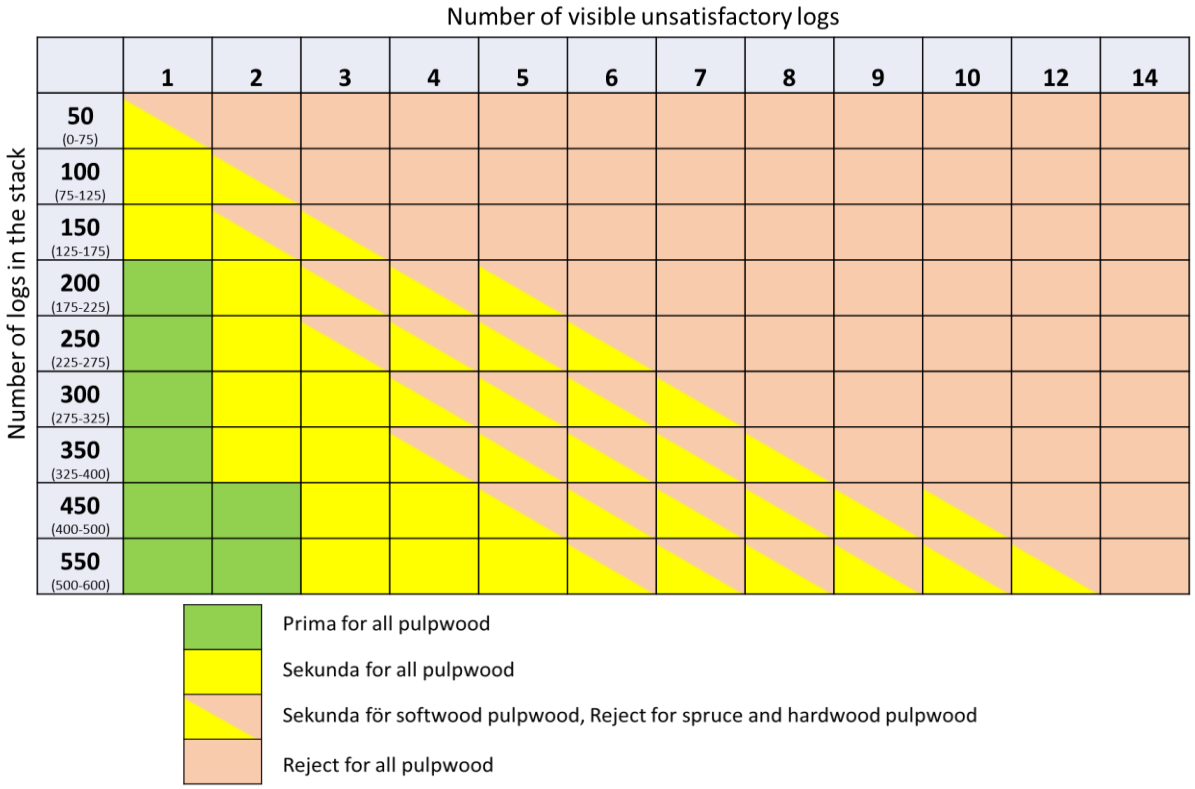
3.2 Incorrect species, dry logs

In Prima pulpwood, a maximum of 1% incorrect species or dry logs are permitted. In Sekunda pulpwood, a maximum of 2% incorrect species or dry logs are permitted. In Sekunda softwood pulpwood, a maximum of 5% incorrect species or dry logs are permitted. When grading is based on photos or the stack is graded from a measurement bridge, Table 2 is used. This is because these errors/defects can be detected in both sides and end surfaces of the stack. Where the stack contains unsatisfactory logs with volumes considerably deviating from the average log, the number of logs is adjusted.

Timber batches containing dry logs can be recorded as a separate assortment. In such cases, an unlimited quantity of dry logs are permitted, see Appendix 1.

Table 2. Assessment of the stack's quality class in terms of incorrect species and dry logs, i.e. wood errors/defects that can be detected in sides and end surfaces of the stacks[2].

[2] Table 2 in the Measurement Instruction is based on the assumption that, for every visible incorrect log, there is at least one more in the stack (Upward Adjustment Factor 2). This factor is based on studies carried out before the grading system was introduced.



3.3 Forest rot

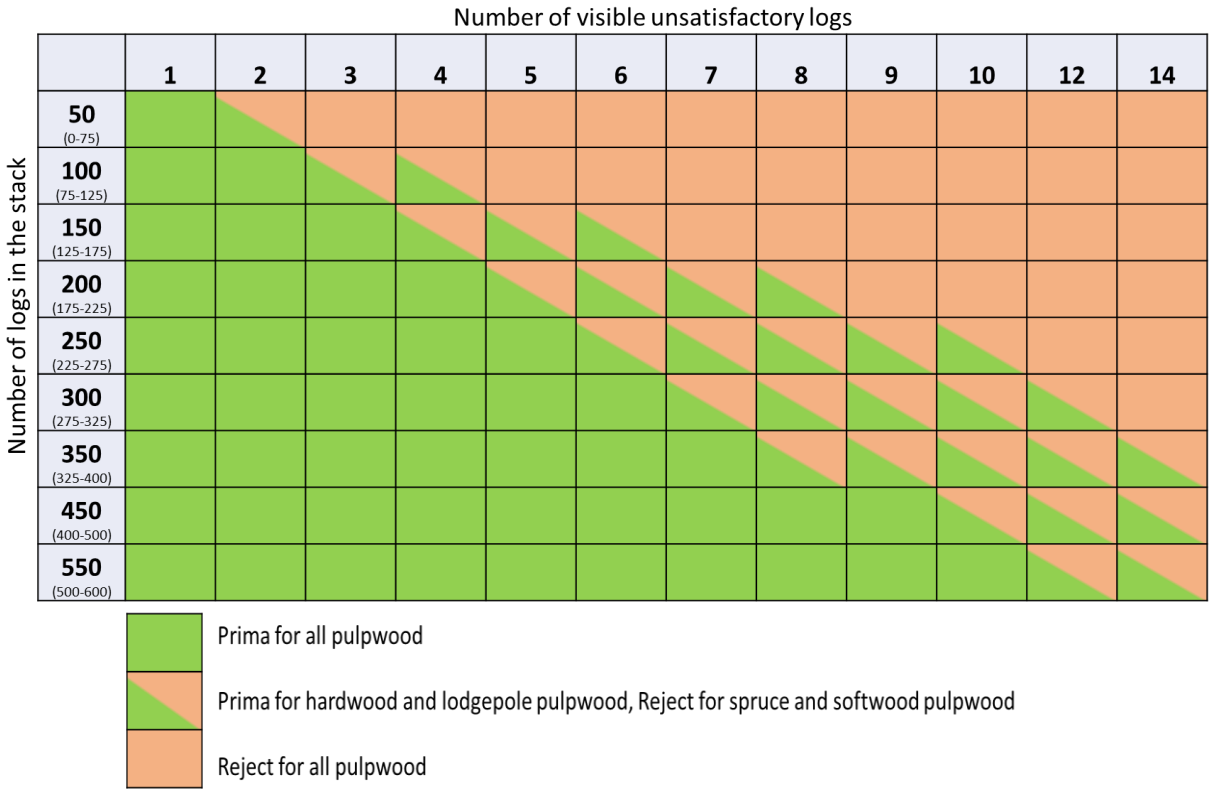
Forest rot is assessed as the proportion of rot area in one end surface of the stack. The rot area includes rot in non-merchantable logs. If both end surfaces are visible, the average is recorded. In Prima and Sekunda spruce pulpwood, a maximum of 2% rot area is permitted. In softwood or hardwood pulpwood, a maximum of 5% is permitted in Prima stacks, and a maximum of 25% in Sekunda stacks.

3.4 Dimensions and delimbing

In Prima and Sekunda spruce or softwood pulpwood, a maximum of 10% of the volume is permitted to have an incorrect dimension (excl. overdimensioned) or unsatisfactory delimbing (see Sections 2.2-2.3). In Prima and Sekunda lodgepole and hardwood pulpwood, a maximum of 20% is permitted.

In grading using photos or from a measurement bridge, Table 3 is used. This is because these defects can mainly be detected in stack sides. Where the stack contains unsatisfactory logs with volumes considerably deviating from the average log, the number of logs is adjusted. Underdimensioned logs can also be detected in the end surfaces of the stack. The number of these logs is divided by four, and the product rounded off downwards to the nearest whole number (1-3 logs = 0, 4-7 logs = 1, 8-11 logs = 2, etc).

Table 3. Assessment of the stack's quality class with regard to delimbing faults, length errors, dimension errors excluding overdimension, and crooks, i.e. wood defects that can mainly be detected in stack sides. The number of underdimensioned logs is divided by four[3].



3.5 Overdimensioned logs

Overdimensioned logs are not permitted in either Prima or Sekunda pulpwood. For the assortment "thick pulpwood" the maximum diameter is 1250 mm, and for other assortments the maximum diameter is 700 mm. See Appendix 1.

3.6 Foreign matter, 'dirty' logs

Stacks, or logs in stacks, may not contain foreign matter (see Section 2.8).

A maximum of 5% of the stack volume may comprise 'dirty' logs (logs contaminated by soil on landings or in the forest).

[3] Table 3 in the Measurement Instruction is based on the assumption that, for every visible incorrect log, there are at least four more in the stack (Upward Adjustment Factor 5). This factor is based on studies carried out before the grading system was introduced.

4 Assessment of freshness and storage decay

Grading of a stack into a quality class may, on agreement, be supplemented by an assessment of freshness and/or storage decay. Such agreements require measurement officials to be present at the measurement site, i.e. this assessment may not be based on remote measurement using photos. An agreement on inspection by an official may be made for sites where measurement is usually carried out in the form of remote measurement.

Wood that, on delivery, satisfies the requirement regarding the permitted number of weeks of storage is regarded as fresh. On agreement, other regulations than those described in Table 4 may be applied.

Table 4. Permitted number of summer storage weeks from week of felling for the pulpwood to be classed as fresh.

Summer period		Permitted number of summer storage weeks	
Southern Sweden	Northern Sweden	Spruce pulpwood	Other pulpwood
1/4 - 31/10	1/5 - 30/9	four weeks	eight weeks

- *Southern Sweden is Götaland and Svealand except the county of Dalarna and Torsby municipality in the county of Värmland. Northern Sweden is the counties of Norrland and Dalarna and Torsby municipality in the county of Värmland (division according to the Swedish Forestry Act).*
- *The location (part of Sweden) refers to the storage location, not the measurement location.*

Spruce pulpwood may be inspected if the cutting week is unknown, or if the permitted number of weeks has been exceeded. Dry logs and logs of incorrect species are exempt from the inspection. For a stack to be classed as fresh, at least 90% of its volume must be assessed as fresh. Other pulpwood may also be inspected if the permitted number of summer storage weeks has been exceeded. Easily debarked wood is classed as fresh.

For a stack to be classed as storage decayed, at least 10% of its volume must comprise logs with storage decay.

On agreement, wood that is not classed as fresh or storage decayed may either be refused for grading or graded using special assortment codes (see Section 1.4).

5 Grading based on control group

When grading is based on a control group, all units in the group are first measured/graded with a simple procedure (stack grading, weighing, counting). A sample is then selected randomly and carefully graded and/or certain properties measured. The information obtained is used to produce a group conversion figure that, in turn, is used to adjust the quantity and, in certain cases, quality shown in the simple measurement and/or to convert it to a different type of measurement unit.

Control group measurement can be divided into two categories:

1. A group where the quality (the grading class of the stack) is determined in the simple measurement.

2. A group where the quality is not determined in the simple measurement.

Group where the quality (the grading class of the stack) is determined in the simple measurement.
For this category, the quantity and quality class is determined for every stack in the simple measurement (quality class according to the regulations in Chapter 3). The quantity from the simple measurement is adjusted on the basis of the results from the more comprehensive measurement. The quality class of the stack is not determined in the comprehensive measurement. The result is shown in the form of a group-adjusted volume (m^3s ub) and the distribution of this volume by quality classes. **Addition concerning measurement done by VMF Estonia and VMF Latvia**
The grading of stacks as Prima or Sekunda is not done by VMF Estonia and VMF Latvia. Instead the proportion of non-merchantable logs, based on rules described in Chapter 2, and the rot volume, based on conversion figures in Chapter 5, is determined for each stack.

Group where the quality is not determined in the simple measurement.
For this category, which can apply to loads on trains, boats, etc, the quality (proportion of non-merchantable logs) is determined on the basis of the sample units (using log-by-log measurement). On agreement, the measurement of the sample units may include measurement and recording of logs with storage damage.

Rot area (forest rot) is converted to rot volume, using the following conversion figures:

- Softwood species 25 litres / dm^2 rot area (northern Sweden)
  27 ” / ” (southern Sweden)
- Hardwood species 32 ” / ” (all of Sweden)

The results from the sample units are applied to the entire group. The result is shown in the form of a group-adjusted volume (m^3s ub) and the proportion of non-merchantable volume, divided according to the reasons for being ‘non-merchantable’.

Storage decay
For all wood imported by boat to Sweden between 1 August and 30 November, it is recommended that the proportion of storage decay is determined via sampling, where the wood is cut at the ends of all logs in the sample.

Freshness
Freshness can only be determined in connection with the simple measurement.

6 Checks of grading

Quality grading is checked on randomly selected stacks (measurement units). The check is to be carried out as a new grading of the stack in the same condition it was in at the time of the original grading, for example regrading using photos*.

If the distribution of products is included in the grading forming the basis for payments in a commercial transaction, this is to be checked. The entire sample stack (or corresponding measurement unit) is then to be measured log-by-log.

In check grading of larger batches where the quality is not determined in the simple measurement, the check is carried out on randomly selected logs from the sample units.

Checks do not include freshness or storage decay.

It must be possible to present the results from the check grading as:

- Accuracy percentage: The proportion of stacks/logs whose original grading corresponds with the check grading.
- Quality value deviation: The difference between the value indicated by the original grading and the value based on the original measured volume and distribution of products, the check grading's distribution of products, and the checked grading class. Consequently, this calculation does not include any errors in determining the stack volume.
- Value deviation: The difference between the value indicated by the original grading and that indicated by the check grading when deviations in quantity measurement have been taken into account.

A relative pricelist is to be used for calculating quality value deviations and value deviations.

** This will be introduced when method support, IT support, and a reporting system are available. Until then, checks of stack quality grading are to take the form of log-by-log measurement where reason(s) for 'non-merchantable' assessment and rot proportion in the log-end surfaces are recorded, after which the quality class is assessed.*

7 Revision history

23 February 2006	Instructions adopted by the Council for Measurement and Reporting, with recommended application from 1 August 2006 (VMR 1-06). The instructions replaced Chapter 4 in the Measurement Instructions VMR 1-99.
1 January 2014	The instructions may be applied in accordance with the decision of the SDC Board. The instructions are introduced after decisions made in each measuring company. Title change from *Measurement Instructions for Pulpwood* to *Quality Requirements for Pulpwood*. The section *Quantity determination* is moved to other instruction documents.
1 January 2016	Addition: • The measured assortment, such as hardwood pulpwood, may be divided according to tree species or species groups

	• Basic requirement to inform those concerned in the event of suspicion that a delivery of imported roundwood contains toxins or radioactivity • Logs may not be impregnated, painted, processed or used for long period for other purposes. • Minimum length of 270 cm for varying lengths in VMF Nord The concept of 'satisfactorily fresh' is deleted The component tree species for spruce pulpwood is changed to include Sitka spruce on agreement
1 August 2016	Title changed from *SDC Instructions* to *Swedish Instructions*.
1 January 2017	Section 2.3: Text correction, "length of branch is less than..." Chapter 4: Updated titles for results of checked measurements.
1 January 2019	VMF Syd, VMF Qbera, VMF Nord and SDC merged to form Biometria
1 August 2019	Grading quality classes of stacks called Prima and Sekunda. Measurement instruction and application guide merged. Includes appendices 2 and 4. Minimum length of 290 cm for varying lengths throughout the country Same limit for branch stub/crook height, 16 cm, for all pulpwood assortments. The limit on the permitted amount of forest rot in an individual log is removed. Changed definition of dry log. Addition of appendices: • Assortment 16 • Summary of agreement-based regulations Title changed to *Grading of Pulpwood*. Adjusted by VMK to be used by VMF Estonia and VMF Latvia that do not use grading quality classes of stacks as Prima or Sekunda.
1 September 2019	Section 2.4. *When measuring net volume, rot area should* be converted to a rot volume, see Chapter 5. Section 3. The beginning is changed so that it is used by VMF Estonia and VMF Latvia while doing delivery check. Appendix 2. Reason codes are changed for stack measurement for VMF Estonia and VMF Latvia.
1 January 2020	Section 2.2: Definition of "thick pulpwood". More precise information about assortments 18 and 19 in Appendix 1. Appendix 5 added.
1 October 2020	Figure 1 adjusted.
1 April 2021	Section 2.2. Buttress where biggest diameter is more than three times the lowest diameter is equated with delimbing errors. Section 2.3. To be considered a fork, the fork limb must be at least half the main stem's diameter under bark.
1 April 2022	Figure 2 added.
1 August 2022	Revision after merger between VMK and Biometria in June 2022. Figure 2 revised – measuring length on a log with fork. Section 2.2. "If the log is cut in such a way that the length measurement based on the thickest fork limb is smaller than the minimum merchantable length, and the log has a longer limb, measurements of the log length and top diameter are instead based on the longer limb., i.e. not the thickest."

1 January 2023	Section 2.3. "… out to the outermost solid part of the branch stub, immediately above the stub" changed to "…to the maximum height of the branch stub." Appendix 5. Examples concerning birch and aspen added.
1 April 2025	Section 2.1 moved to Section 1.4. Minor changes in text. Section 3.1. New text added: "If the stack or part-stack… concealed stack that are to be assessed" Chapter 4. New text added in final sentence, "…may either be refused for grading or graded using…"

Appendix 1 Use of Assortment Codes 16, 18 and 19

Assortment code 16 (may include pulpwood suitable for sawing, special pulpwood)
On 29 May 2019, the Board of Biometria adopted the following regulations for the use of Assortment Code 16. The aim of the regulation is to:

1. Identify the sawable proportion in pulpwood deliveries (product distribution in accordance with Section 2.1)
2. Enable trading of timber batches containing timber damaged by bark beetle (dry logs)

The timber should be recorded as Assortment Code 16 (recorded assortment), after which the timber is divided according to product (divided assortment). The entire measurement unit/stack is included in the volume that forms the basis for grading in accordance with Chapter 3, i.e. all the sub-assortments, including 'Sawable'.

Table 5. Use of Assortment Code 16 for batches with dry logs and for distinguishing the proportion of sawable logs in pulpwood deliveries.

Assortment (recorded assortment)	Quality regulations	Dry logs	Distribution of products (sub-assortments)	Requirement for sub-assortment 'Sawable'		
				Min. diameter	Max. proportion of rot in log end	Max. yield loss
1600	Softwood pulpwood	Unlimited extent	Pine, spruce, 'sawable'.	14 cm or 18 cm	5%	120 cm
1690	Softwood pulpwood	Prima 1%, Sekunda 5% (incl. incorrect species)	Pine, spruce, 'sawable'.	14 cm or 18 cm	5%	120 cm
1620	Spruce pulpwood	Prima 1%, Sekunda 2% (incl. incorrect species)	Spruce, 'sawable'.	14 cm or 18 cm	5%	120 cm

Assortment Code 18 (Thick pulpwood)
When using the assortment 'Thick pulpwood', the maximum log diameter (the largest individual diameter measurement) must be between 600 mm and 1250 mm under bark. When stacks are graded as Prima or Sekunda class, logs whose diameter is less than 600 mm are counted as underdimensioned. For such logs, the limits apply as stated in Table 1, page 8, row "Branch, fork, dimension". This means for spruce and softwood pulpwood, a maximum of 10% of the stack volume, and for Lodgepole and hardwood pulpwood 20%. Because the number of logs is often low, the grading must be based on other factors than those in Table 3.

Assortment Code 19 (dry logs may be included)
In Assortment 19, unlimited numbers of dry logs may occur. Compared with Assortment 1600, Assortment Code 19 is used when there is no need to identify a sawable proportion of the volume.

Appendix 2. Reason codes used in log-by-log and stack measurement

Table 6 shows the reason codes used for non-merchantable logs (log-by-log measurement) and stacks not classified as Prima class (stack grading). If there is more than one reason for the log/stack, the reason with the lowest number in the table is recorded. In stack measurement, crook width, incorrect length, underdimension and preparation are included in Reason 7.

Table 6. Reason codes used in log-by-log and stack measurement.

Reason	Log-by-log measurement (non-merchantable)	Stack grading		
		VMF Estonia and Latvia	Sekunda	Reject / Measurement refusal
	code	code	code	code
Incorrect species/assortment/dry log	1	1	1	1
Width of crook	2	7		7
Forest rot	-	6	3	3
Overdimensioned	4	4	-	4
Log length, underdimensioned	5	7		7
Forest rot in a deliverable log	6	6		
Preparation (branches, forks, buttress, etc.)	7	7	-	7
Dirt covered	-	8		8
Contamination (coal, soot, plastic, stones, metal, etc.)	8	8	-	8
Storage decay	9*	9		9*

*Storage decay is not part of grading in Prima/Sekunda classes

Appendix 3 Summary of agreement-based (dispositive) regulations

Section 1.3. Basic requirements for grading – delivery check

- On agreement, non-merchantable stacks can be recorded as a different assortment, assuming that the requirements for this assortment are satisfied.

Chapter 2. Quality requirements relating to individual logs

- In many cases, the tree species that can be approved in an assortment may be decided by agreement.
- Assortments such as hardwood pulpwood may be divided according to tree species (groups) / products. Other grounds for division than tree species may be applied; see Appendix 1 on use of Assortment Code 16.
- Requirements regarding dimensions may be decided by agreement.
- For beech pulpwood, requirements regarding delimbing may be decided by agreement.
- Storage rot: With the exception of spruce pulpwood, logs with 10-33% storage decay in the cross-section may be merchantable and recorded with a special code.

Chapter 3. Grading of stacks as Prima or Sekunda

- On agreement, a stack that does not satisfy the requirements for Sekunda class may be classed as Reject.
- Timber batches containing dry logs can be recorded as a separate assortment.
- Overdimensioned timber can be recorded as a separate assortment.

Chapter 4. Assessment of freshness and storage damage

- Grading of a stack into a quality class may, on agreement, be supplemented with an assessment of freshness and/or storage damage.
- On agreement, other regulations may be applied regarding the maximum number of permitted summer storage weeks than those described in Table 4.

Appendix 4. Table for assessing rot proportion

In stack measurement, the proportion of rot is assessed in the end surface of the stack. If both end surfaces of the stack are visible, an average of the proportions is calculated and recorded. To simplify assessment of the rot proportion, the first step can be to estimate the rot area in dm^2. The table below can then be used to convert the rot area to an end surface percentage. The table is based on:

- Bank width 230 cm
- Wood volume percentage: Spruce/softwood pulpwood 56% / Hardwood pulpwood 48%

Table 7. Table for calculating the proportion of rot in the end surface of a stack

Spruce pulpwood					
		Rot area in dm2			
Stack height	2	4	6	8	10
cm	Rot area percentage for the stack %				
100	2	3	5	6	8
150	1	2	3	4	5
200	1	2	2	3	4
250	1	1	2	2	3
300	1	1	2	2	3
Softwood pulpwood					
		Rot area in dm2			
Stack height	10	15	25	50	75
cm	Rot area percentage for the stack %				
100	8	12	19	39	58
150	5	8	13	26	39
200	4	6	10	19	29
250	3	5	8	16	23
300	3	4	6	13	19
Hardwood pulpwood					
		Rot area in dm2			
Stack height	10	15	25	50	75
cm	Rot area percentage for the stack %				
100	9	14	23	45	68
150	6	9	15	30	45
200	5	7	11	23	34
250	4	5	9	18	27
300	3	5	8	15	23

Prima
Sekunda
Reject

Appendix 5. Examples of assessment of forest rot in spruce, birch and aspen

Forest rot is caused by the root rot fungi, *Heterobasidion annosum*, or ticks (wood fungi) on the stems. Root rot fungi spreads up through the tree, usually in its central parts. Depending on the stage of the rot, the rot is called:

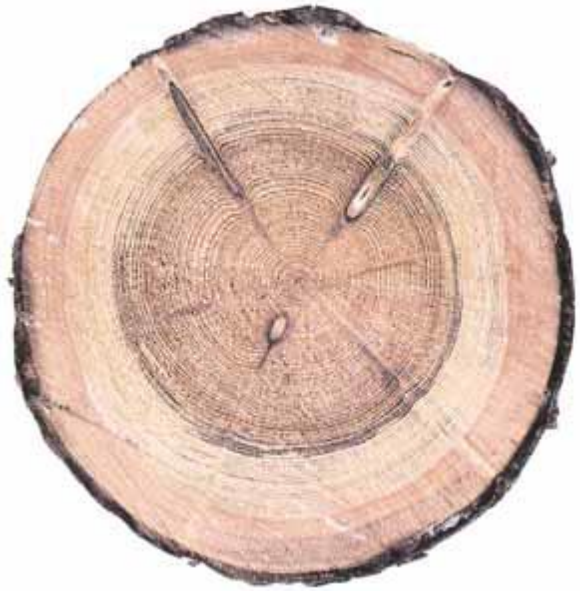
- aniline wood
- light, solid rot
- dark, solid rot
- soft rot/rot holes

In accordance with Section 2.4, forest rot is a quality defect if it is dark and/or soft. However, aniline wood and light, solid rot is permitted in pulpwood. In practical measurement of a stem cross-section with rot, it can be difficult to determine which type of rot is involved and the extent of the rot. As a practical guideline for assessment, the following apply:

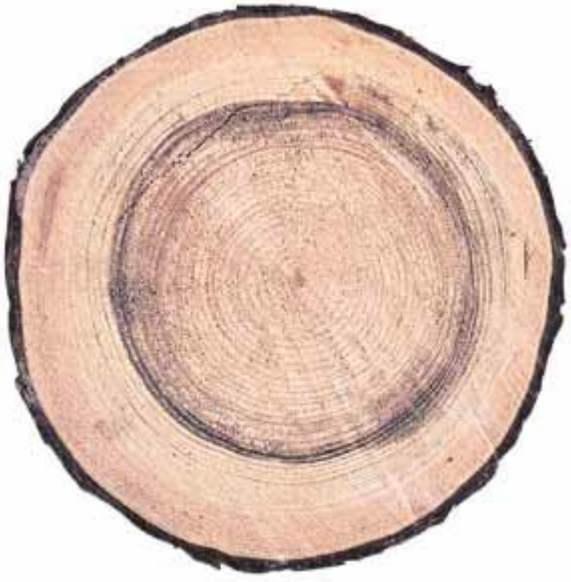
Type of rot	**Action**
Aniline wood	None
Aniline wood with enclosed light, solid rot	None
Patches of dark rot	Areas of dark rot are counted
Continuous band/ring of dark rot. Light, solid rot inside this ring.	Only the area of the ring is counted
Continuous central dark rot	The entire area is counted

Forest rot in spruce

The first two examples below show how it is often difficult to decide between light and dark rot. These are followed by four examples of rot in different stages.



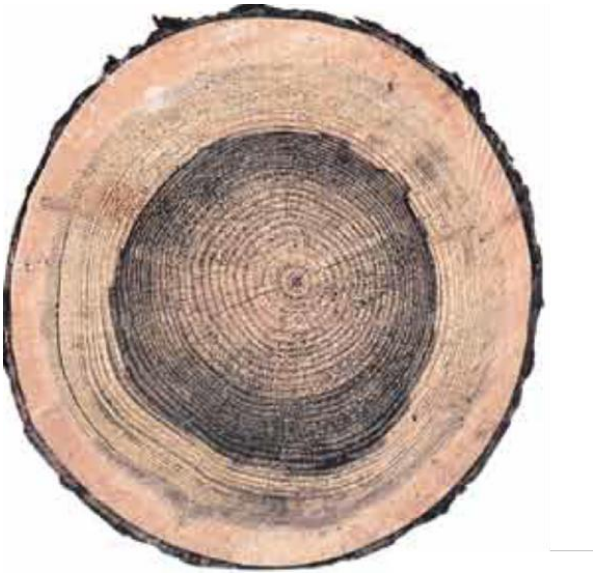
Disc with moderate brown forest rot.



Disc with ring-shaped dark, solid rot.

The rot is assessed as dark rot. The entire dark area is counted as rot damaged.

The disc contains aniline wood, which marks the tree's defence zone against root rot attack. The wood is not rot damaged in this stage.



A clear, dark zone marks the boundary between the rot in the middle of the disc and the aniline wood. The entire dark area is assessed as dark rot. If the rot continues to develop, it first becomes soft rot and finally forms a rot hole.

The rot inside the ring has a colour shade that is on the limit of what can be accepted as 'light' rot. Only the area of the ring is counted as rot damaged.

Disc with patches of dark, solid rot. Only these are counted. Slightly developed aniline wood.

In this disc, light, solid rot has formed inside a weakly coloured zone of aniline wood. Light, solid rot is not counted.

Forest rot in birch

For birch, it is often difficult to differentiate between red heart and solid forest rot, so birch is exempted from the general rule that solid rot is counted as rot damaged.

Birch with red heart. Not to be assessed as rot. Dark patches in the end surface are also regarded as red heart providing the wood is solid.

Birch with dark, loose rot.
The entire rot surface is counted as rot damaged.

Birch with light, loose rot.
The entire rot surface, including the black ring, is counted as rot damaged.

Forest rot in aspen

	Tick rot in aspen – the entire surface inside the thin, dark ring (including the ring) is assessed to be loose/dark rot. The pale grey or light brown surface outside the ring is not counted as rot.
	Aspen with loose rot. The entire dark and loose surface is counted as rot damaged.
	Aspen with small patches of dark rot. The entire surface of the patches is counted as rot damaged.

Swedish instructions for timber measurement are adopted by the Biometria Board on the basis of recommendations from RMR (Council for Measurement and Reporting). The documents for RMR are prepared by the Biometria department for strategic development. This instruction has been adapted by Biometria for use by the Biometria-authorised measuring companies VMF Estonia and VMF Latvia.

The instructions are published on www.biometria.se.

Postal adress
Biometria ek för
Box 89
751 03 UPPSALA
SWEDEN

W: www.biometria.se

E: info@biometria.se

T: +46 10-228 50 00