

# Quality Requirements / Description for Grade I Pine Sawlogs



 +371 26 775 855

 [www.mezacikls.lv](http://www.mezacikls.lv)

 [helvijs@mezacikls.lv](mailto:helvijs@mezacikls.lv)

 Daugavpils, Latvia

 Sigulda, Latvia



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# General Section

## General Conditions

- Timber must be prepared from the **living part of the tree stem** (a stem section is considered alive if more than 50% of the cross-sectional area is involved in nutrient transport).
- The **working cylinder of the log** is an imaginary cylinder with a diameter equal to the **top-end diameter of the log minus 1 cm**.
- Quality assessment must be carried out **based on the visible part of the log**.
- Logs rejected during grading must have the **corresponding rejection reason indicated in the defect classification**.
- If technically possible, logs that do not meet the highest grade must have the **reason for downgrade indicated**.
- **Harvester feed roller marks and impressions are not considered mechanical damage**.

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# Reduction

## General Reduction Conditions

Reduction means **a decrease in volume applied when shortening the length or reducing the diameter eliminates rejection or downgrade of the log**.

- If both length reduction and diameter reduction are possible, the reduction method that results in the **smallest volume loss** must be chosen.
- Volume reduction is based on defects affecting the **working cylinder or the log end surface**.
- Length reduction is calculated based on the **entire log length and expressed in whole decimetres**.
- The step of length reduction corresponds to the **length grading defined in the measurement order**.



Reduction symbols used in the table “*Quality requirements and maximum allowable wood defects*”:

Nav – no reduction

G – length reduction

C – diameter reduction

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## **Maximum Reduction Limits**

- Maximum allowable **length reduction is 12 dm** (or **24 dm if applied from one side only**).
  - Logs with **mechanical damage on the end surface** must be shortened to the **next nominal commercial length**.
  - Logs with **felling or cross-cut cracks** must be shortened by at least **6 dm**.
  - Maximum diameter reduction is permitted **down to the minimum allowable diameter**.
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## **Definitions of Defects and Measurement / Evaluation of Wood Defects**

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### **1. KNOTS**

#### **Definition**

A **knot** is the portion of a branch embedded in wood.

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#### **1.1 Overgrown knot**

A knot **not visible on the side surface of the log**, indicated only by bark overgrowth scars or bumps.

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## 1.2 Rotten knot

A knot affected by **decay**.

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## 1.3 Dead knot

A knot **partially fused with surrounding wood**, regardless of how much of the knot perimeter is attached, but **without decay**.

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## 1.4 Sound knot

A knot fully **intergrown with the stem wood around its entire perimeter and without signs of decay**.

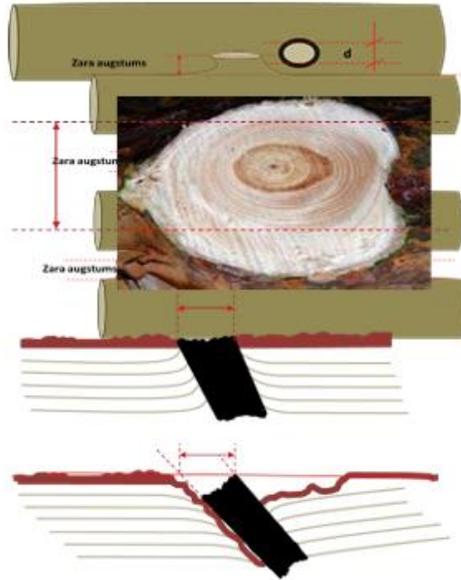
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## Measurement

### Knot diameter

The diameter of the **largest knot** is measured at the **narrowest point without bark**.

For sound knots, the diameter is measured **along the outer edge of the darkest annual growth ring**.



## Knot height

Knot height is defined as the **highest point of the knot measured perpendicular to the log surface above the bark.**

A **broken knot still attached to the log is not included in the knot stub length.**

A knot is considered broken when it shows **reduced resistance when bent.**

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## Evaluation

### Knot height

The distance is measured from the **log surface or knot collar to the highest point of the knot, perpendicular to the log surface.**

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## 1.5 Spike knot (branch stub)

A branch growing at a **narrow angle**, where the ratio of the largest to smallest diameter is **equal to or greater than 3:1**, with bark inclusion above it.

Evaluation:

Only the **presence of the defect** is evaluated.

## 2. CRACKS

### Definition

A **crack** is the separation of wood fibres in the longitudinal direction.

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### 2.1 Pith cracks

One or more **radial cracks originating from the pith** (where the crack opening is widest) and extending toward the sapwood.

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### 2.2 Drying cracks

Short, narrow and shallow cracks caused by **drying of the timber**.

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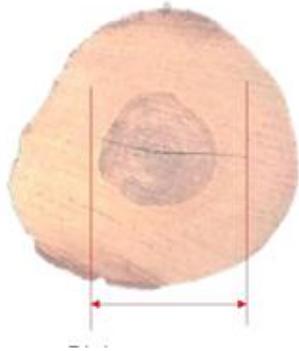
### Measurement

#### Crack width

The **maximum crack width** is measured.

#### Crack length

Measured on the **log end surface**.

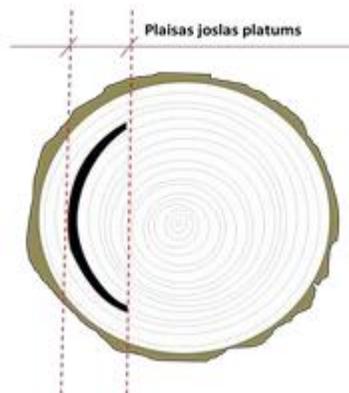


## 2.3 Ring shake

Cracks running **along the annual growth rings**.

### Measurement

The **width of the crack band** is measured.



## 2.4 Frost and lightning cracks

Long radial cracks formed in a **living tree due to frost or lightning**, running from sapwood toward the pith.

Evaluation:

The **presence of the defect** is assessed.



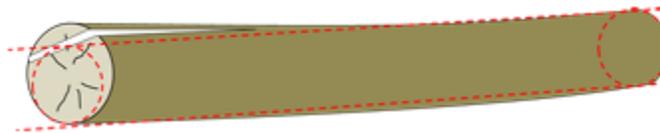
## 2.5 Felling and cross-cutting cracks

Cracks formed during **tree felling or cross-cutting**, visible on the log end and extending longitudinally.

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### Evaluation

The **impact of the crack on the working cylinder** is assessed.



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## 3. STEM FORM DEFECTS

### Definition

#### 3.1 Butt swell

A significant **thickening of the butt end of the stem**.

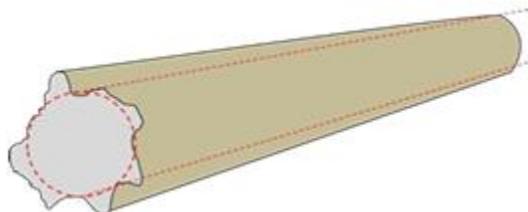
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##### 3.1.1 Fluted butt swell

Longitudinal grooves formed at the **butt end of the stem**.

Evaluation:

The **effect on the working (peeling) cylinder** is assessed.

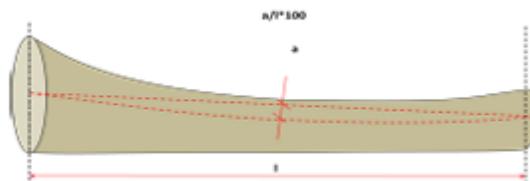


## 3.2 Curvature

Deviation of the **log longitudinal axis from a straight line**.

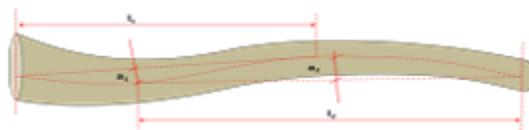
### Measurement

The maximum deviation **a** from the straight axis is measured relative to the log length and expressed as a **percentage**.



### Evaluation

The **highest curvature value** is used for assessment.



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## 4. WOOD STRUCTURE DEFECTS

### 4.1 Double pith

Presence of **two piths in the cross-section of the log**, each with its own annual ring system, surrounded by common outer rings.

Evaluation:

The **presence of the defect** is assessed.

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### 4.2 Dead surface (dry side)

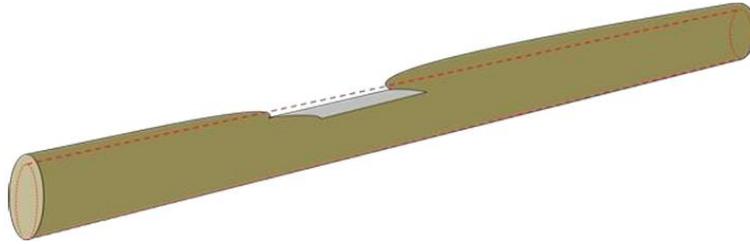


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A section of the stem surface that **died while the tree was still growing**, usually formed after bark damage and creating a depression in the wood.

Evaluation:

The **effect on the working/peeling cylinder** is assessed.



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## **5. FUNGAL DAMAGE**

### **Definition**

Biological deterioration of wood caused by **fungi or bacterial infection**.

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### **5.1 Heartwood fungal damage**

Fungal or bacterial infection that develops in **living trees**, entering through roots, broken branches, or damaged bark.

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#### **5.1.1 Forest rot (including cavity)**

A stage of fungal development where the **wood colour changes and mechanical strength decreases**.

Evaluation:

The **presence of the defect** is assessed.

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### **5.2 Sapwood fungal damage**



Fungal infection that develops from the **outer surface of logs that have dried out or been stored for long periods.**

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### **5.2.1 Sapwood discoloration / blue stain**

A stage of fungal development where the **colour of wood changes without reducing mechanical strength.**

#### **Measurement**

The **depth of the defect** is measured on the **log ends and side surfaces.**

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### **5.2.2 Storage rot**

A stage of fungal development where **wood colour changes and mechanical properties deteriorate.**

Evaluation:

The **presence of the defect** is assessed.

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## **6. INSECT / LARVAL DAMAGE**

### **Definition**

A **tunnel-like hole or cavity in the wood caused by insect larvae.**

Evaluation:

The **depth of the defect in the wood** is assessed.

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## **7. MECHANICAL DAMAGE**

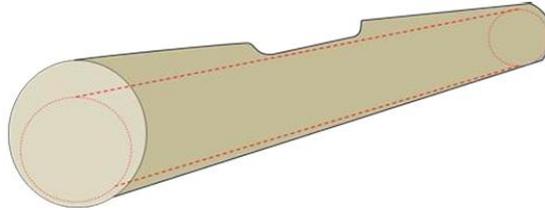
### **7.1 Mechanical damage**



Various types of damage to the **end or side surface of the log that affect the wood structure.**

Evaluation:

The **impact on the working (peeling) cylinder** is assessed.



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## **7.2 Charred wood**

Wood that has been **burned or scorched.**

Evaluation:

The **presence of the defect** is assessed.

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## **7.3 Metal inclusions**

Metal objects embedded in wood.

Evaluation:

In automated measurement systems —  
metal inclusions are detected using **stationary metal detectors.**

Where such detectors are not installed —  
metal inclusions are assessed **visually.**

## Quality Requirements and Maximum Permissible Wood Defects

<i>Defect</i>	<i>Maximum Allowed</i>	<i>Reference</i>	<i>Reduction</i>
Overgrown knot	Bump height H >5 mm, max 7 per log	1.1	None
Rotten knot	Diameter >9 mm, max 2 per log or D ≤15 mm	1.2	None
Dead knot	Diameter >9 mm, max 7 per log or D ≤35 mm	1.3	None
Sound knot	Diameter >15 mm, max 1 per log or D ≤40 mm	1.4	None
Spike knot	Not allowed	1.5	None
Pith cracks	Width 2 mm–50% of working cylinder	2.1	Length reduction
Drying cracks	Width ≥2 mm allowed in surface layer	2.2	Length reduction
Ring shake	Crack band ≤80 mm	2.3	None
Frost / lightning cracks	Not allowed	2.4	None
Felling cracks	Allowed outside working cylinder	2.5	Length or diameter reduction
Fluted butt swell	Allowed outside working cylinder	3.1/3.1.1	Length or diameter reduction
Curvature	Up to 1.0%	3.2	Length reduction
Double pith	Not allowed	4.1	None
Dead surface (dry side)	Allowed outside working cylinder	4.2	Length or diameter reduction
Forest rot	Not allowed	5.1/5.1.1	None
Sapwood blue stain	Depth ≤3 mm	5.2/5.2.1	None
Storage rot	Not allowed	5.2/5.2.2	None
Insect damage	Depth ≤3 mm	6	None
Mechanical damage	Allowed outside working cylinder	7.1	Length or diameter reduction
Charred wood	Not allowed	7.2	None
Metal inclusions	Not allowed	7.3	None