TreProX: Innovations in Training and Exchange of Standards for Wood Processing

TIMBER QUALITY SORTING

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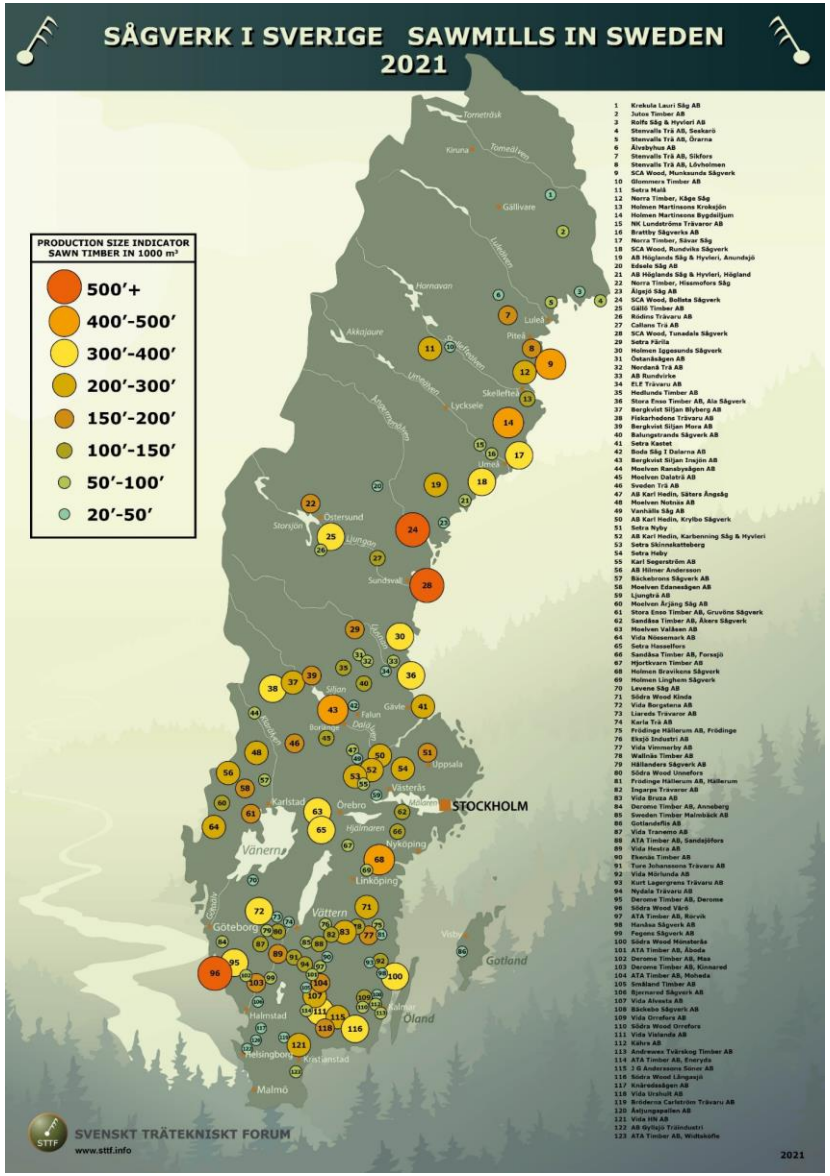
TREPROX WORKSHOP – ICELAND - OCTOBER 2021

TreProX
Landbúnaðarháskóli Íslands Agricultural University of Iceland
skógrækt in ICELANDIC FOREST SERVICE
Trétæknirádgjöf slf. Wood Technology
UNIVERSITY OF COPENHAGEN
Linnæus University
Erasmus+

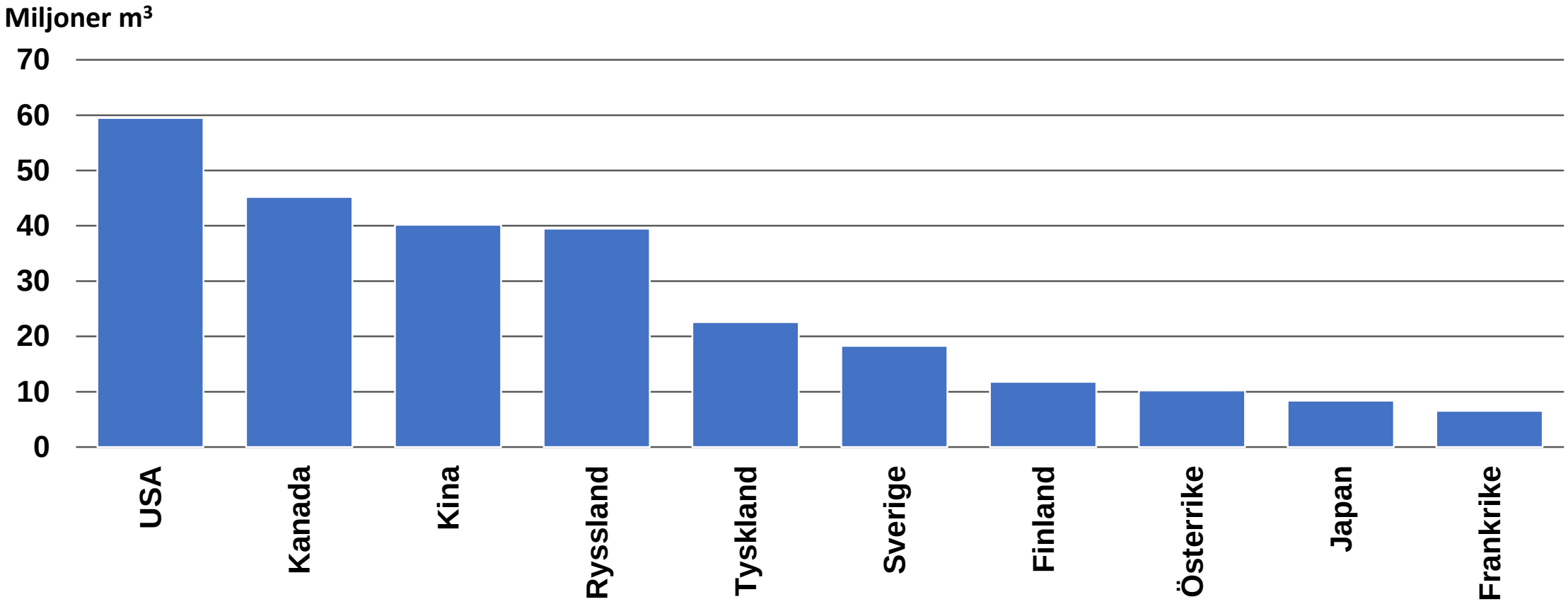
SVENSKT TRÄTEKNISKT FORUM

SÅGVERK I SVERIGE SAWMILLS IN SWEDEN 2021



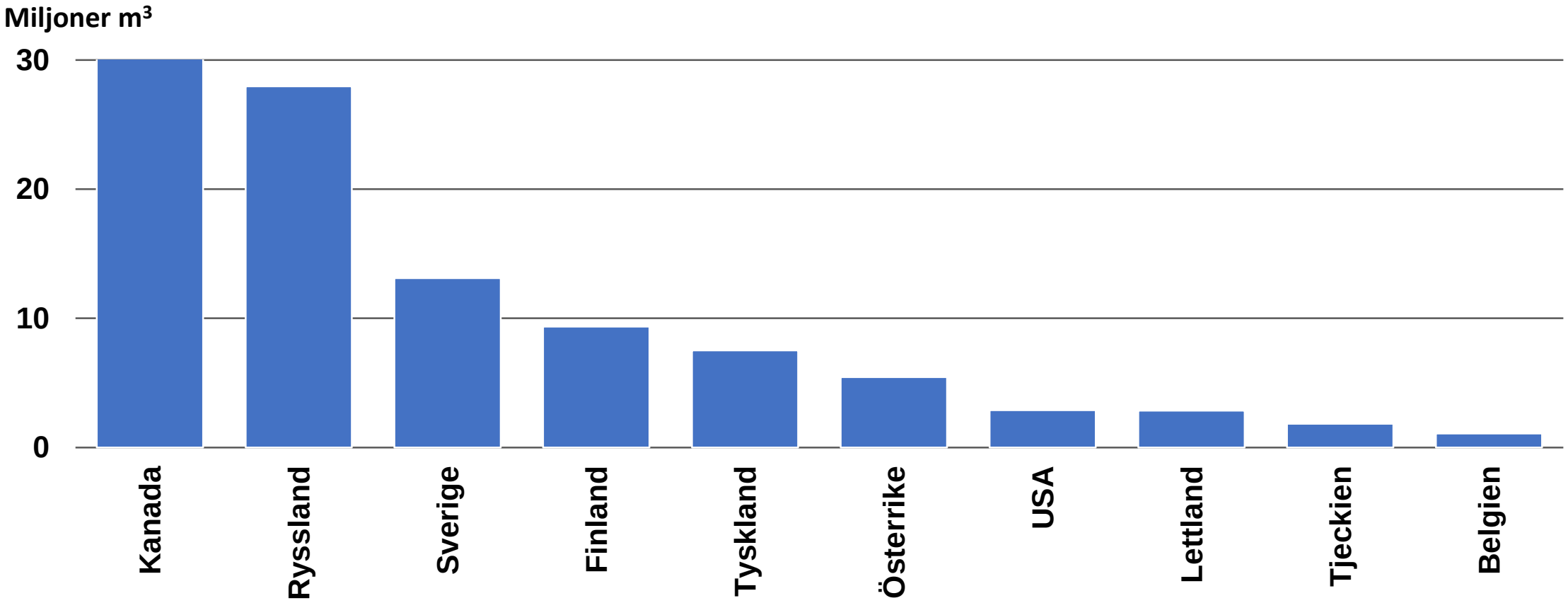
1 Krokula Lauri Såg AB
2 Jutos Timber AB
3 Rolfs Såg & Hyvleri AB
4 Stenvalls Trä AB, Seskarö
5 Stenvalls Trä AB, Örarna
6 Älvsbyhus AB
7 Stenvalls Trä AB, Sikfors
8 Stenvalls Trä AB, Lövholmen
9 SCA Wood, Munksunds Sågverk
10 Slommers Timber AB
11 Setra Haparanda
12 Norra Timber, Kåge Såg
13 Holmen Martinsons Krokeån
14 Holmen Martinsons Bygdsiljum
15 NK Lundströms Trävaror AB
16 Brattby Sågverks AB
17 Norra Timber, Sävar Såg
18 SCA Wood, Rundviks Sågverk
19 AB Höglands Såg & Hyvleri, Ansundsjö
20 Edsele Såg AB
21 AB Höglands Såg & Hyvleri, Högland
22 Norra Timber, Hissmofors Såg
23 Ågsjö Såg AB
24 SCA Wood, Bollsta Sågverk
25 Gällö Timber AB
26 Rödins Trävaru AB
27 Callans Trä AB
28 SCA Wood, Tunadals Sågverk
29 Setra Färila
30 Holmen Iggesunds Sågverk
31 Östanåsågen AB
32 Nordanå Trä AB
33 AB Rundvirke
34 ELF Trävaru AB
35 Hedlunda Timber AB
36 Stora Enso Timber AB, Ala Sågverk
37 Bergkvist Siljan Blyberg AB
38 Fiskarbodens Trävaru AB
39 Bergkvist Siljan Mora AB
40 Balungstrands Sågverk AB
41 Setra Kastet
42 Bods Såg I Dalarna AB
43 Bergkvist Siljan Insjön AB
44 Moelven Ranabysågen AB
45 Moelven Dalaträ AB
46 Sveden Trä AB
47 AB Karl Hedin, Sätera Ångsåg
48 Moelven Notnäs AB
49 Vanhälls Såg AB
50 AB Karl Hedin, Krylbo Sågverk
51 Setra Nyby
52 AB Karl Hedin, Karbenning Såg & Hyvleri
53 Setra Skinnskatteberg
54 Setra Heby
55 Karl Segerström AB
56 AB Hilmer Andersson
57 Bäckebrinns Sågverk AB
58 Moelven Edanesågen AB
59 Ljunghrå AB
60 Moelven Årjäng Såg AB
61 Stora Enso Timber AB, Gruvöns Sågverk
62 Sandåsa Timber AB, Åkers Sågverk
63 Moelven Valåsen AB
64 Vida Nässemark AB
65 Setra Hasselfors
66 Sandåsa Timber AB, Forsajö
67 Hjortkvarn Timber AB
68 Holmen Braviksens Sågverk
69 Holmen Linghem Sågverk
70 Levene Såg AB
71 Södra Wood Kinda
72 Vida Borgstena AB
73 Lisreds Trävaror AB
74 Karla Trä AB
75 Prödinge Hällerum AB, Prödinge
76 Ekajö Industri AB
77 Vida Vimmerby AB
78 Wallnäs Timber AB
79 Hällandens Sågverk AB
80 Södra Wood Unnafors
81 Prödinge Hällerum AB, Hällerum
82 Ingarps Trävaror AB
83 Vida Bruzs AB
84 Derome Timber AB, Anneberg
85 Sweden Timber Malmbäck AB
86 Gotlandsflis AB
87 Vida Tranemo AB
88 ATA Timber AB, Sandsjöfors
89 Vida Hestra AB
90 Tkenäs Timber AB
91 Ture Johanssons Trävaru AB
92 Vida Mörlunda AB
93 Kurt Lagergrens Trävaru AB
94 Nydala Trävaru AB
95 Derome Timber AB, Derome
96 Södra Wood Värö
97 ATA Timber AB, Rörvik
98 Hanåsa Sågverk AB
99 Fegens Sågverk AB
100 Södra Wood Münsterås
101 ATA Timber AB, Åboda
102 Derome Timber AB, Hiss
103 Derome Timber AB, Kinnared
104 ATA Timber AB, Moheda
105 Smålands Timber AB
106 Bjernered Sågverk AB
107 Vida Älvsets AB
108 Bäckebo Sågverk AB
109 Vida Orrefors AB
110 Södra Wood Orrefors
111 Vida Vislanda AB
112 Kåhrs AB
113 Andreewex Tvärskog Timber AB
114 ATA Timber AB, Eneryda
115 J G Andréassons Sönner AB
116 Södra Wood Långasjö
117 Kinbrodsågen AB
118 Vida Urshult AB
119 Bröderna Carlström Trävaru AB
120 Åsbyngspellen AB
121 Vida Hlv AB
122 AB Gyllsjö Träindustri
123 ATA Timber AB, Widtskifte

Largest producers of sawn timber



Källa: FAO, bearbetning Skogsindustrierna

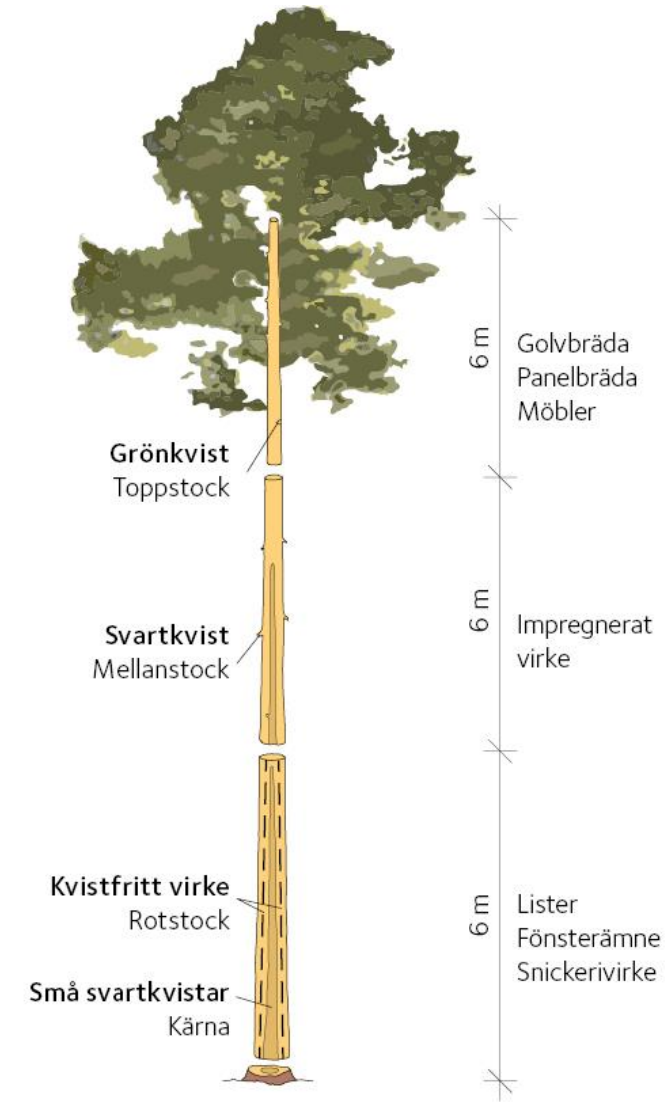
Largest exporting countries of sawn timber



Källa: FAO, bearbetning Skogsindustrierna

Varifrån kommer virket - furu?

- Golvbräda
  - **Furu med frisk grön kvist**
- Invändiga paneler
  - **Furu med frisk grön kvist**
- Impregnerat virke
  - **Djupimpregnering**
- Lister
  - **Splintved från rotstock hos furu**
- Naturligt beständigt virke
  - **Kärnvirke hos furu**
- Snickerivirke

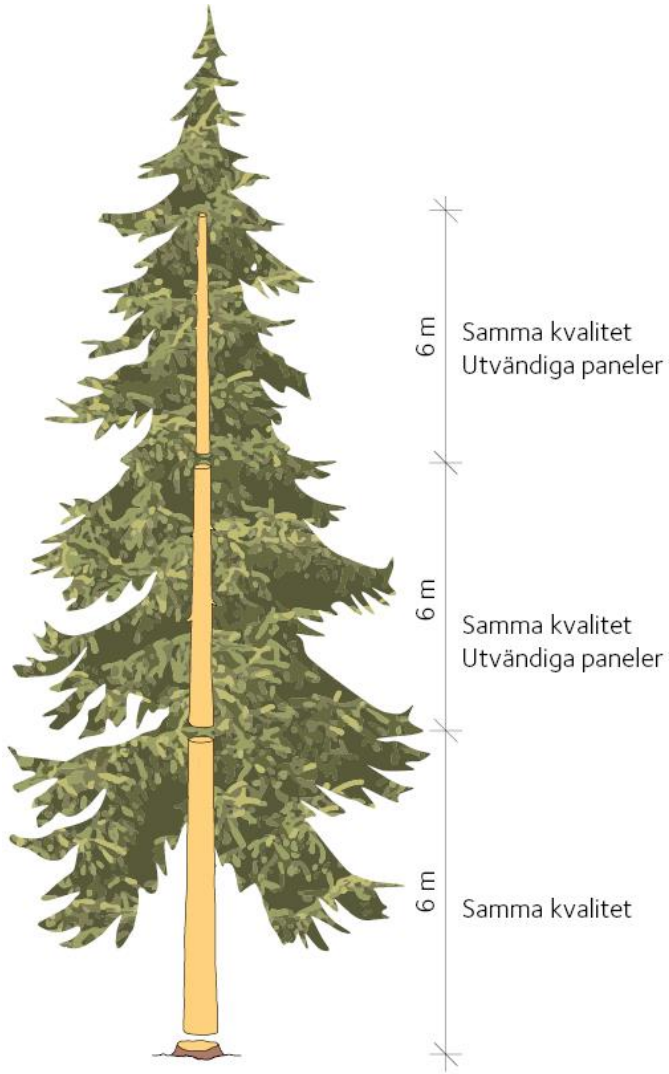


Figur 31 Tallens olika typer av kvistar

Att välja trä, sid 31

Varifrån kommer virket - gran?

- **Byggvirke**
- **Konstruktionsvirke**
  - **Sorteras efter främst kvistigheten**
- **Utvändiga Paneler**
  - **Gran med frisk grön kvist**



Figur 32 Granens olika typer av kvistar

Att välja trä, sid 31

EDITION 1:2020

Commercial Grading of Timber

Grading Rules

Suomen Sahateollisuusmiesten Yhdistys

STTF

Treindustriens Tekniske Forening

SWEDISH WOOD

Was it better before?

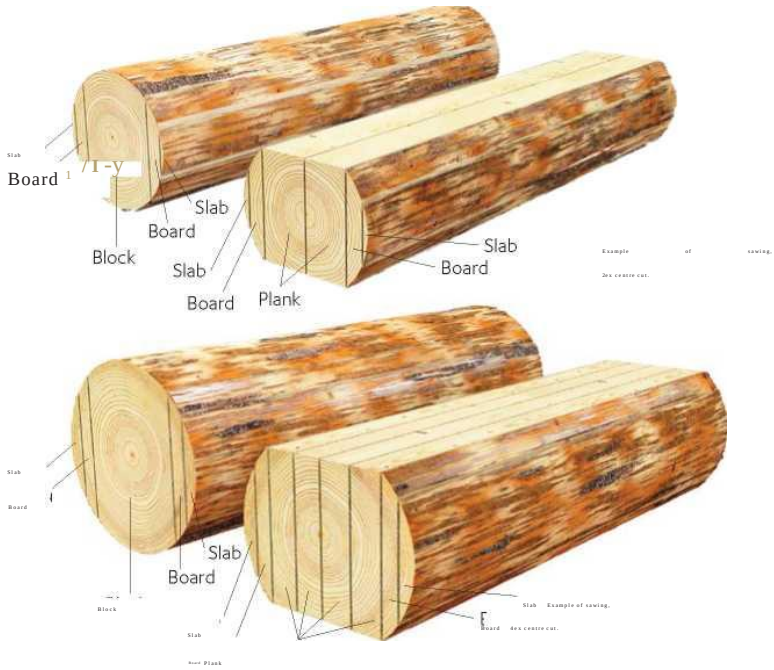
Sawing patterns

The sawing patterns described below are the desired cuts through a log. Deviations from these patterns are always possible, on the basis of the inner structure and outer shape of a log.

Sawing, 2ex and 4ex centre cut
(Nordic sawing practices)

Definition

The first cut takes boards from the two opposite sides of the log. Then, the remainder of the log (the block) is turned 90 degrees and is cut into boards and planks. The block is cut through the centre (pith-sawing). The other saw-cuts result in the centre yield (planks) and side yield (boards). The centre yield consists of an even number of timber pieces, of the same width and the same or different thickness.

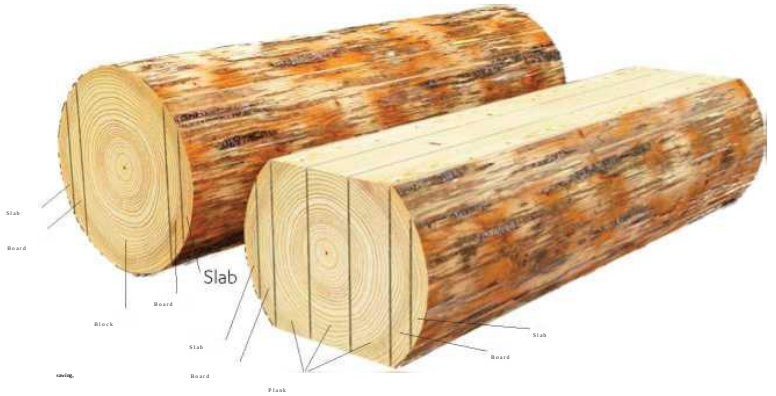


Example of sawing, 2ex centre cut.

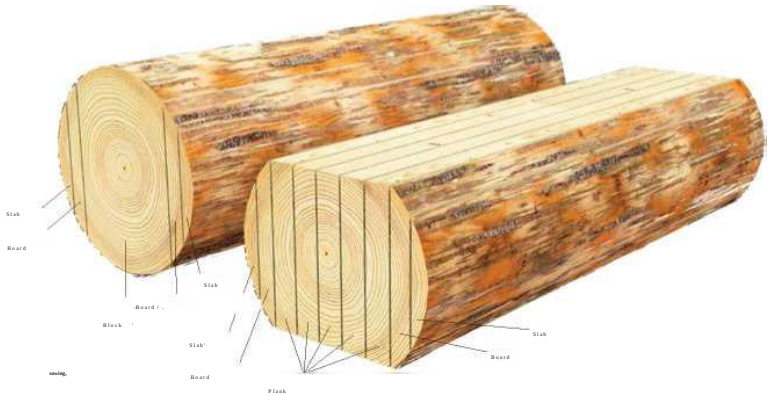
Sawing, 3ex and 5ex cut

Definition

The first cut takes boards from the two opposite sides of the log. Then, the remainder of the log (the block) is turned 90 degrees and is cut into boards and planks. The block is divided with a single saw-cut on either side of the pith, so that the pith ends up in the centre piece. The other saw-cuts result in the centre yield (planks) and side yield (boards). The centre yield consists of an odd number of timber pieces, of the same width and the same or different thickness.



Example of sawing, 3ex cut.



Example of sawing, 5ex cut.

GRADES						
US				V (Fifths)	VI (Sixths)	VII
US I	US II	US III	US IV	V	VI	VII

Type of timber product	Grade	Species
Dimension planed timber	V - VI	Spruce and pine
Construction timber	III - V	Spruce and pine
Tongue-and-groove underlay	V - VI	Spruce
Formwork timber	VII or better	Spruce and pine
Wooden packing material	VI - VII	Spruce and pine
Exterior panel boards and bargeboards	V or better	Spruce
Interior panel boards	IV or better	Pine and spruce
Planed timber for interior woodwork	IV or better	Pine
Floorboards	V or better	Pine and spruce
Fences and planks	V or better	Spruce, impregnated pine
Mouldings	I - II	Pine

Determination of grade

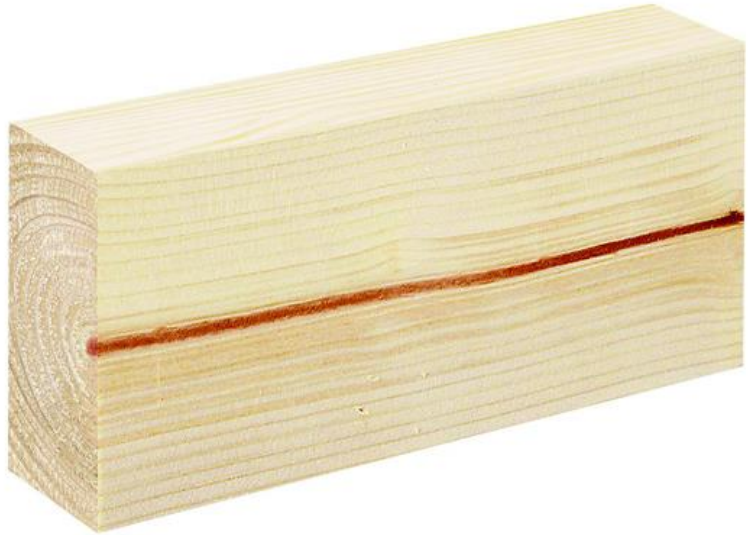
The basis of classification is the location, number, size and type of the various timber properties, the largest permitted values being those in Grading Tables 1–3

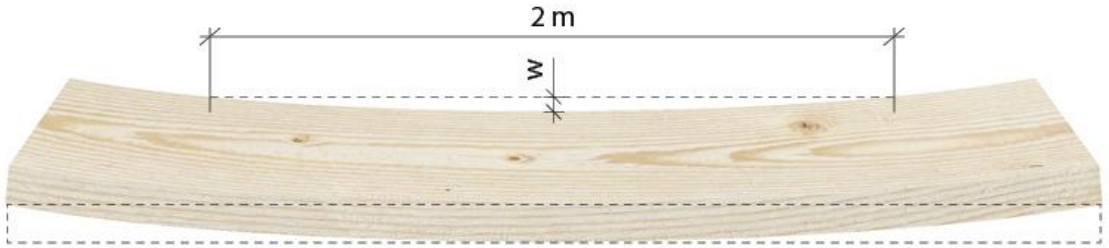
• Each side of a piece of timber is to be evaluated separately.

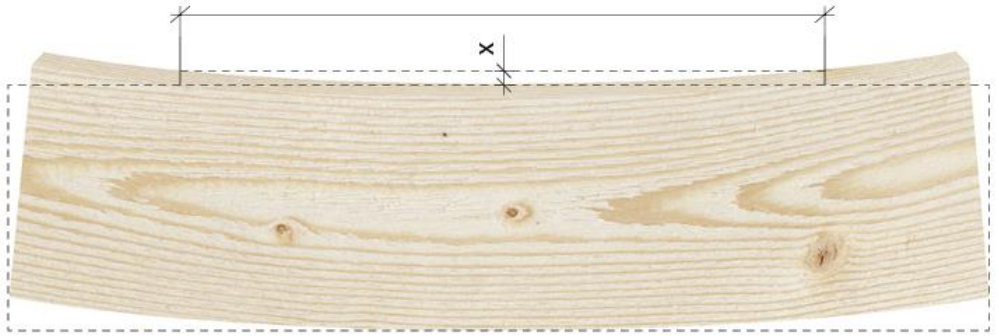
• The tables show the maximum values for each of the timber properties that are permitted in each respective GRADE, on the worst metre of the timber's length (warp 2 m).

• GRADE – the appropriate grade assignment is determined for the faces and edges of the piece of timber.

• One freely selected face of the timber piece is allowed to be one GRADE lower than the




2 m
w


x


y
2 m


z

US IV				V					VI				
Sound knot	Dead knot	En¬cased knot	Max. no.	Sound knot	Dead knot	En¬cased knot	Un¬sound knot	Max. no.	Sound knot	Dead knot	En¬cased knot	Un¬sound knot	Max. no.
4	4	2	7	5	5	3	3	11	-	-	-	-	Un¬limited
			Sum of sound knots					Sum of sound knots					Un¬limited sum
20	14	10	80	35	25	21	18	175	55	55	55	55	-
25	18	13	100	40	28	24	20	200	60	60	60	60	-
30	21	15	120	45	32	27	23	225	65	65	65	65	-
35	25	18	140	50	35	30	25	250	70	70	70	70	-
25	18	13	100	40	28	24	20	200	60	60	60	60	-
30	21	15	120	45	32	27	23	225	65	65	65	65	-
35	25	18	140	50	35	30	25	250	70	70	70	70	-
40	28	20	160	55	39	33	28	275	75	75	75	75	-
30	21	15	120	45	32	27	23	225	65	65	65	65	
35	25	18	140	50	35	30	25	250	70	70	70	70	-
40	28	20	160	55	39	33	28	275	75	75	75	75	-
45	32	23	180	60	42	36	30	300	80	80	80	80	-
35	25	18	140	50	35	30	25	250	70	70	70	70	-
40	28	20	160	55	39	33	28	275	75	75	75	75	-
45	32	23	180	60	42	36	30	300	80	80	80	80	-
50	35	25	200	65	46	39	33	325	85	85	85	85	-
2	2	1	4	3	3	2	2	6					Un¬limited
85	60	43		100	70	60	50		100	100	100	100	
60	42	30		85	60	51	43		100	100	100	100	
	70	50			70	60	50			100	100	100	

Grading Table 2 **Other features.**

Feature	GRADE of the timber surface					
Maximum permitted	**US I**	**US II**	**US III**	**US IV**	**V**	**VI**
Bark pocket and scar (either one)						
Number on the worst metre	0	0	0	1	1	1
Length of a single feature (mm)	0	0	0	100	200	300
Width of a single feature (mm)	0	0	0	10	15	30
Resin pocket						
Number on the worst metre	0	1	1	2	2	2
Length of individual resin pocket (mm)	0	20	40	50	100	150
Resin wood						
Percentage of the area of the side (%)	0	0	0	5	30	50
Reaction wood (compression wood) and curly grain (either one)						
Percentage of the area of the side (%)	0	0	0	10	20	50
Slope of grain and slope of fissures						
Magnitude of deviation (a:b)	1:15	1:15	1:12	1:10	1:7	1:2
Top rupture						
Percentage of the width of the side (%)	0	0	0	10	30	50
Pith, percentage of length of timber piece (%)	100	100	100	100	100	100
Soft rot	0	0	0	0	0	0
Dote, blue stain and mould						
Percentage of the area of the side (%) - deep	0	0	0	0	5	30
Percentage of the area of the side (%) - superficial	0	0	0	0	5	30
Insect attack						
Percentage of the area of the side (%)	0	0	0	0	0	0

Grading Table 3 **Wane, fissures, warp.**

Feature	GRADE of the timber surface					
Maximum permitted	**US I**	**US II**	**US III**	**US IV**	**V**	**VI**
Wane						
Width (mm)	3	3	3	10	15	20
Depth, percent of thickness (%), at:						
timber thicknesses ≤ 25 mm				30	35	40
US I - III, given in (mm)	3	3	3			
timber thicknesses > 25 mm				15	20	25
US I - III, given in (mm)	3	3	3			
Length, percentage of length of timber piece (%)	100	100	100	20	30	40
Fissures, at 20 % moisture content						
Face fissure, not traversing, percentage of length of timber piece (%), at:						
timber thicknesses < 45 mm	0	0	10	20	30	75
timber thicknesses ≥ 45 mm	0	0	15	25	35	100
Traversing fissure, length (mm)	0	0	0	0	0	100
End shake, length on either end (mm)	35	35	35	50	50	100
Ring shake, width (mm)	0	0	10	10	15	30
Warp, at 20 % moisture content Measured on the worst 2 m length						
Bow (mm) at:						
timber thicknesses < 45 mm	5	5	15	15	15	25
timber thicknesses ≥ 45 mm	5	5	10	10	10	20
Spring (mm)	4	4	6	6	6	10
Twist, percentage of width (%), at:						
timber thicknesses < 45 mm	5	5	10	10	10	15
timber thicknesses ≥ 45 mm	5	5	8	8	8	15
Cup, percentage of width (%)	2	2	2	2	2	4

Commercial Grading of Timber

Grading Rules

Some samples from the English version

Sawing patterns

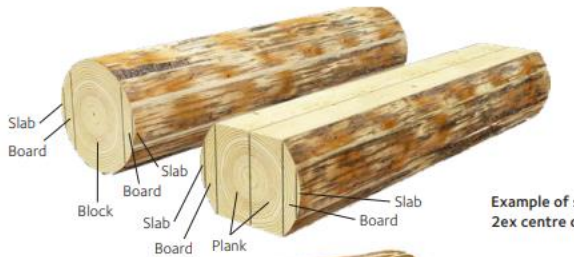
The sawing patterns described below are the desired cuts through a log. Deviations from these patterns are always possible, on the basis of the inner structure and outer shape of a log.

Sawing, 2ex and 4ex centre cut

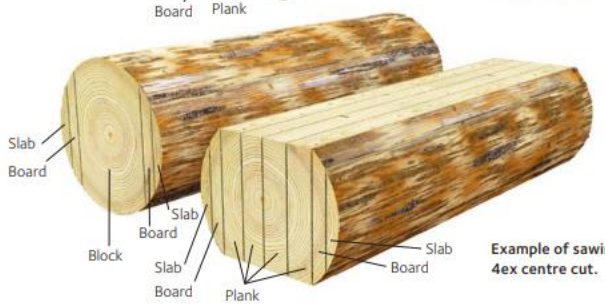
(Nordic sawing practices)

Definition

The first cut takes boards from the two opposite sides of the log. Then, the remainder of the log (the block) is turned 90 degrees and is cut into boards and planks. The block is cut through the centre (pith-sawing). The other saw-cuts result in the centre yield (planks) and side yield (boards). The centre yield consists of an even number of timber pieces, of the same width and the same or different thickness.



Example of sawing, 2ex centre cut.



Example of sawing, 4ex centre cut.

Sawing patterns

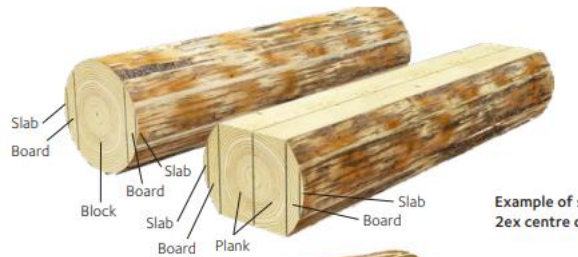
The sawing patterns described below are the desired cuts through a log. Deviations from these patterns are always possible, on the basis of the inner structure and outer shape of a log.

Sawing, 2ex and 4ex centre cut

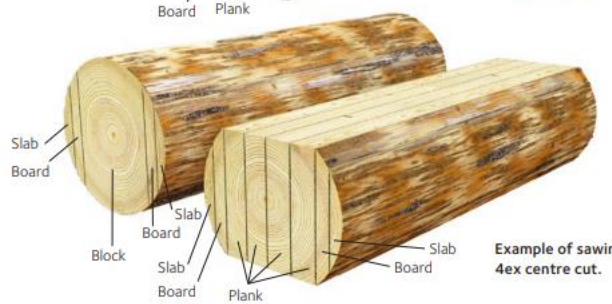
(Nordic sawing practices)

Definition

The first cut takes boards from the two opposite sides of the log. Then, the remainder of the log (the block) is turned 90 degrees and is cut into boards and planks. The block is cut through the centre (pith-sawing). The other saw-cuts result in the centre yield (planks) and side yield (boards). The centre yield consists of an even number of timber pieces, of the same width and the same or different thickness.



Example of sawing, 2ex centre cut.

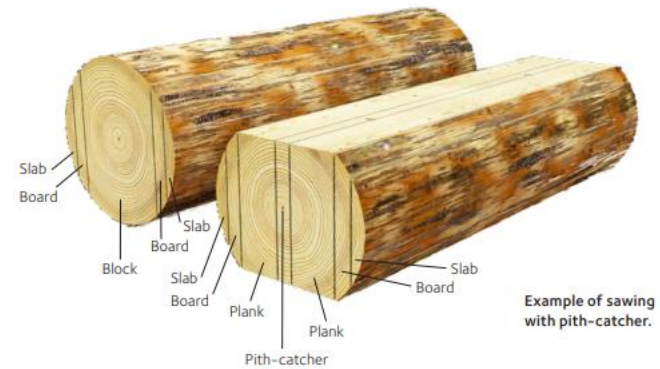


Example of sawing, 4ex centre cut.

Sawing with pith-catcher

Definition

The first cut takes boards from the two opposite sides of the log. Then, the remainder of the log (the block) is turned 90 degrees and is cut into boards and planks. The block is divided with a single saw-cut on either side of the pith, so that the pith ends up in the centre piece (the pith-catcher). The other saw-cuts result in the centre yield (planks) and side yield (boards). The centre yield consists of an even number of timber pieces, of the same width, the same or different thickness, and a thin central piece.



Example of sawing with pith-catcher.

Location on timber piece

In order to grade a piece of timber you need to be able to locate the grade requirements to a certain side of the piece, a certain part of the length or part of the cross-section, for instance one edge.

Sides of the timber piece

Sides of the timber piece	Definition
Face	Either of the two wider, opposite longitudinal surfaces of the piece of timber, or any longitudinal surface if the piece has a square cross-section.
Outside face (external face)	The face further from the pith of the log.
Inside face (internal face)	The face that is nearer to the pith of the log.
Better face	The face that, when a particular grading rule is applied, is judged to be better than the other face.
Worse face	The face that, when a particular grading rule is applied, is judged to be worse than the other face.
Edge	Either of the two narrower, opposite longitudinal sides of a square-edged timber piece.
Arris	Line of intersection between an edge and a face, or between two faces (if the piece has a square cross-section).
Arris towards outer face	Arris between edge and outside face.
Arris towards inside face	Arris between edge and inside face.

Description of timber grading

Quality grades

Classification

Sawn timber is divided into the following quality grades, on the basis of its timber properties:

GRADES						
US				V (Fifths)	VI (Sixths)	VII
US I	US II	US III	US IV	V	VI	VII

The main groupings are the grades US, V, VI and VII.

GRADE US
GRADE US is the highest of the main grades. GRADE US includes unspecified portions of the sub-grades US I – US IV that are not sorted after sawing. Of these, GRADE US I is valued the highest (in terms of quality).

GRADE V
Falling GRADE V at the grading of the production (Fifths).

GRADE VI
Falling GRADE VI at the grading of the production (Sixths).

GRADE VII
For GRADE VII, no threshold values are specified in the tables. For GRADE VII, the properties that a given piece of timber may have are currently permitted without restrictions. However, the piece of timber must at least hold together.

The sawblade needs to have touched the larger part of all sides of the timber piece. For side yield, it is acceptable if 1/3 of the length on one face has not been touched.

Grading is to be done, by contract or agreement, either separately for each grade or by combining different grades – for example, as follows:

GRADE US + V
This designation refers to an unspecified part of GRADE US – GRADE V that is not sorted after sawing. It is also called saw falling.

GRADE US + V + VI
This designation refers to an unspecified portion of GRADE US – GRADE VI that is not sorted after sawing. It is also called saw falling, including GRADE VI.

In the above examples, the unspecified leftover portion of each grade can be bigger or smaller, depending on:
- the region
- the dimensions of the timber
- the specific sawmill within the same region.

By agreement, multiple different grade combinations can be put together.

GRADE MIXTURE
A GRADE MIXTURE is a customised combination of grades used when grading timber for a particular purpose, involving a mix of permitted timber properties from the main groupings GRADE US, V, VI and VII. The grades and the permitted timber properties included in the mix are to be specified in the relevant contract or agreement.

Example: The contract/agreement refers to a purchase of GRADE US, but check-fissures according to the criteria of GRADE US III, resin pockets according to GRADE V, wane according to GRADE VI, etcetera.

Table 2 **Timber qualities.** Common timber products, paired with suitable quality grades and species.

Type of timber product	Grade	Species
Dimension planed timber	V – VI	Spruce and pine
Construction timber	III – V	Spruce and pine
Tongue-and-groove underlay	V – VI	Spruce
Formwork timber	VII or better	Spruce and pine
Wooden packing material	VI – VII	Spruce and pine
Exterior panel boards and bargeboards	V or better	Spruce
Interior panel boards	IV or better	Pine and spruce
Planed timber for interior woodwork	IV or better	Pine
Floorboards	V or better	Pine and spruce
Fences and planks	V or better	Spruce, impregnated pine
Mouldings	I - II	Pine

Features – Grading Table 1

Knot type

Below is a description of the different types of knots. The properties of a knot depend on how the knot has developed in the growing tree.

- Sound knot
- Dead knot
- Encased knot
- Unsound knot
- Loose knot.

Knot shape

All knots originate in the pith and extend outwards with an increasing diameter. The shape of a knot on the surface of the timber can vary considerably, depending on how the saw has cut through the knot. These different knot shapes each require their own measurement rules and sets of requirements.

- Round knot
- Oval knot
- Traversing edge knot
- Traversing edge knot (fallen out)
- Not traversing arris knot
- Not traversing arris knot (fallen out)
- Traversing arris knot
- Spike knot
- Splay knot.

Note **Knots**

Definition
A part of a branch that is embedded in wood.

Features – Grading Table 2

Other natural features

A set of biological phenomena in wood, referred to as special features, that have a strong influence on the wood's quality.

- Bark pocket
- Scar
- Resin pocket
- Resin wood
- Reaction wood (compression wood)
- Curly grain
- Slope of grain
- Top rupture
- Pith.

Note **Resin**

Definition
The function of resin is to protect wood, in the event of damage, against micro-organisms and against drying out. It is stored under pressure in the wood's resin channels. When mechanical damage occurs, the resin begins to flow.

Features – Grading Table 3

Production related features

- Wane.

Fissures

- Check:
  - Not traversing
  - Traversing
- End shake
- Ring shake.

Warp

- Bow
- Spring
- Twist
- Cup.

Note **Fissure**

Definition
Opening between the wood cells.

Note **Warp**

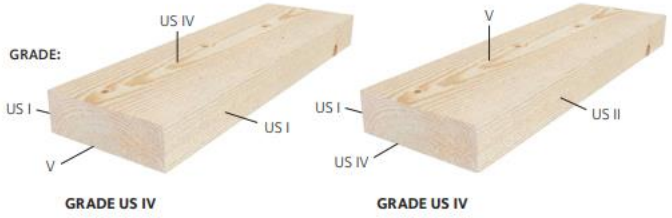
Definition
Distortion of a piece of timber due to changes in its moisture content or the machining process.

Grading tables

Grading methods
Features shall be evaluated and measured in accordance with the preceding section, and the GRADE shall be determined for all four sides of the timber piece in accordance with the requirements from Grading Tables 1 – 3.

Each side is to be evaluated separately and assigned its own GRADE. When determining the grade of the piece of timber as a whole, one freely selected face of the piece is allowed to be one GRADE lower than the GRADE of the piece as a whole.

Determination of grade
Example:



General
The grading rules are applicable to all sawn, or further processed, timber. The rules only specify the lower limit for each quality.
A batch of timber graded according to the criteria of *Commercial Grading of Timber* should contain a reasonable distribution of quality within the grade.

Timburorðasafnið – Trétækniráðgjöf slf

Timburorðasafn sem unnið var í samvinnu Norðurlandanna má finna í **Íðorðasafni** hjá **Stofnun Árna Magnússonar í íslenskum fræðum** og var íslenski hlutinn unninn af Eiríki Þorsteinssyni – Trétækniráðgjöf og er sá hluti eingöngu til í þessari netútgáfu. **Orðasafnið** er ætlað fagmönnum sem eru í viðskiptum með timbur og miðast við skilgreiningar á hráefni, þ.e. hugtök og skilgreiningar fyrir barrtré. Hægt er að leita að orðum á dönsku, finnsku, íslensku, norsku eða sænsku og birtist þá skýringartexti á íslensku og svo viðkomandi orð á öllum hinum tungumálunum. Finna má í meðfylgjandi **orðalista** þau heiti og hugtök sem eru í safninu, í stafrófsröð á íslensku.