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

CERTIFICATION WARRANTY AND STANDARDS

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

Certificaton / Warranty

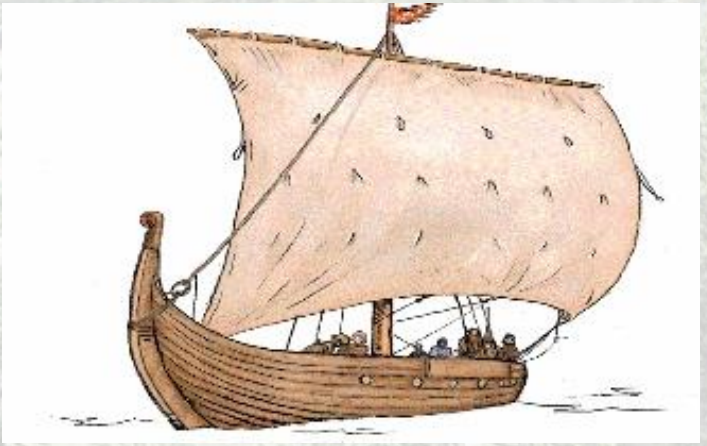
The lecture is divided in five parts and a little about me

1. **The story about forests in Iceland**
2. **The story of timber import to Iceland**
3. **Classification of timber**
4. **Certification and Warranty**
5. **Discussions**

A little about me and timber

- The construction industry from 1964
- Furniture maker
- Denmark 1969 – 1971 – DTI
- Iceland from 1971
- Timber importation and production
- Head of department for timber ITI – Rb –> NMI
  (Innovation Center of Iceland)
- Instruction in classification of timber
- Trétækniráðgjöf slf. (Wood Technology)
- TreProX

The story of timber in Iceland



If there had not been a forest here, the vikings would not have settled.

„At that time the land was woded between the mountain and the sea“
Ari Fróði author of Iclandbook wrote the book year 1122 - 1133

The story of timber in Iceland

How much forest was in Iceland when the vikings came?

If a forest has been grown to a height of 300 m in Icland, the forest is approx 30.000 km^2.

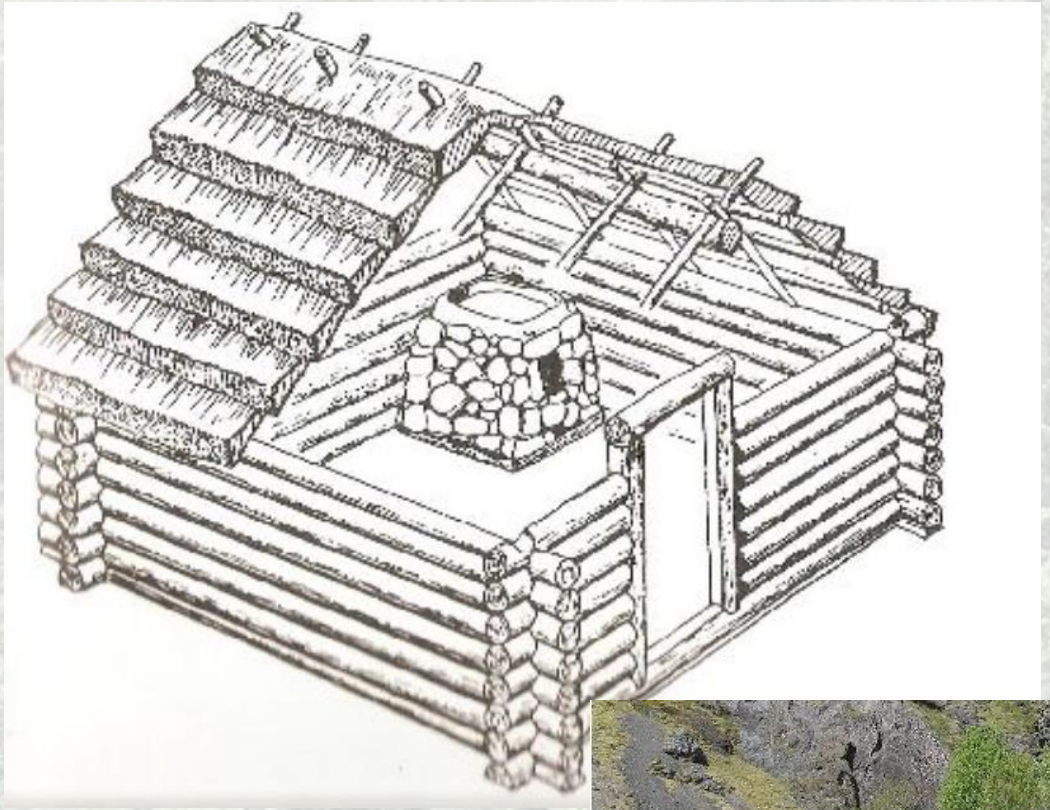
A birch forest that is 40 years old has volum af approx. 2500 m^3 per km^2 which is approx. 50 billion m^3 of wood in the beginning of the settlement

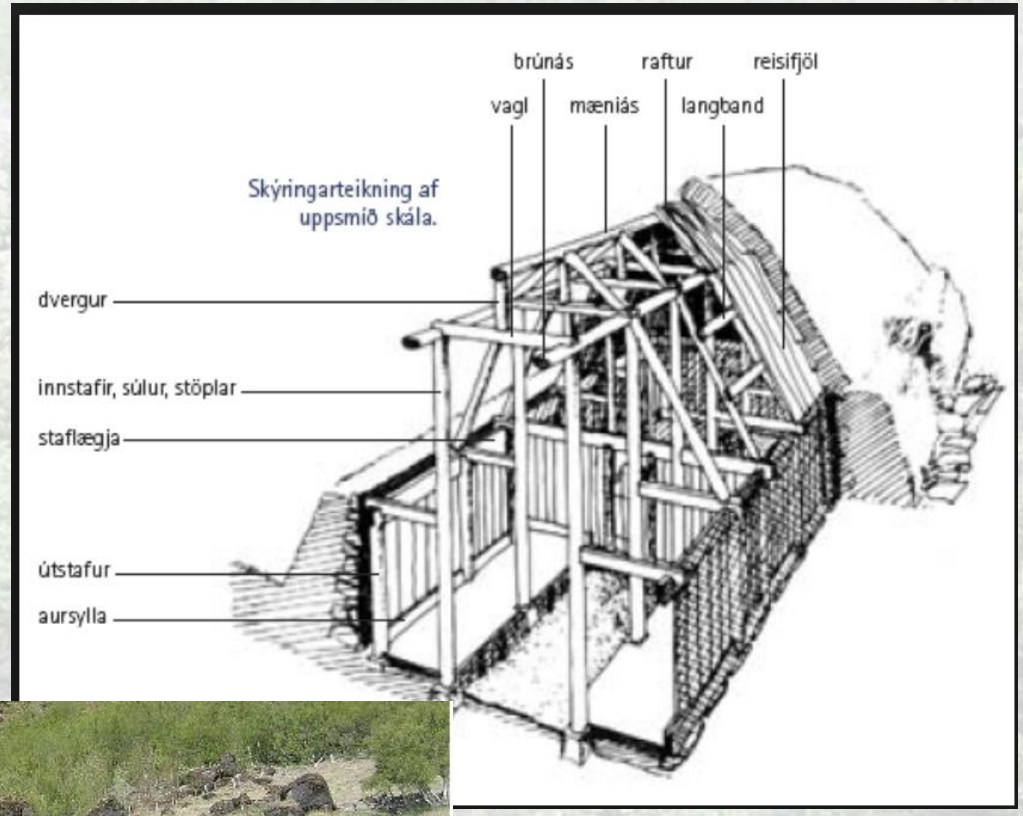
What was the wood used for?

- House building and ship building
- Firewood
- Charcoal making
- Livestock grazing

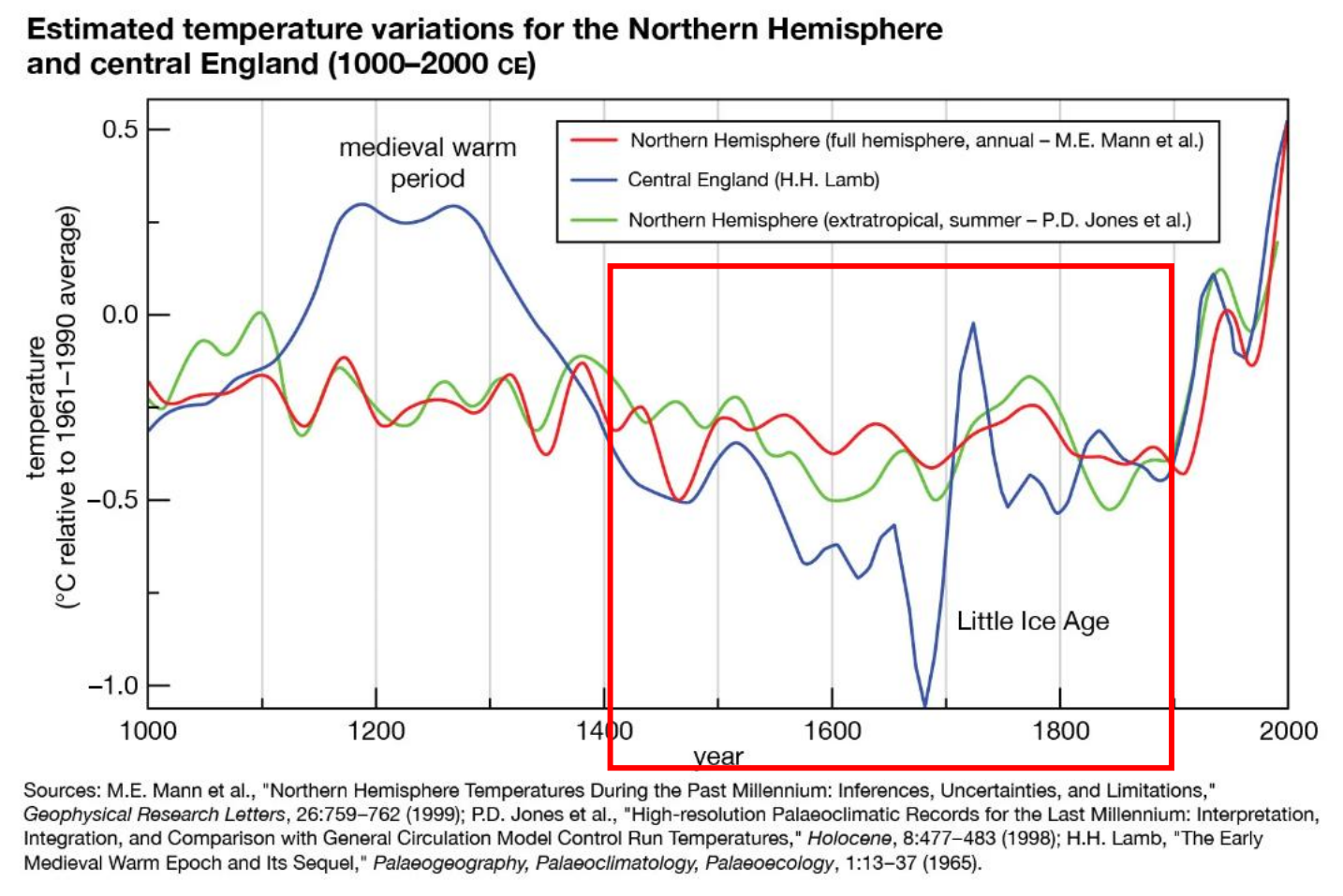
To produce charcoal, we need to fell about 25.000 m^3 per year. That is about 12 million m^3 the 500 years after settlement. Forest growth in birch forest of 30.000 m^2 is approx. 2.5 million m^3 per year.

The story of timber in Iceland





The story of timber in Iceland



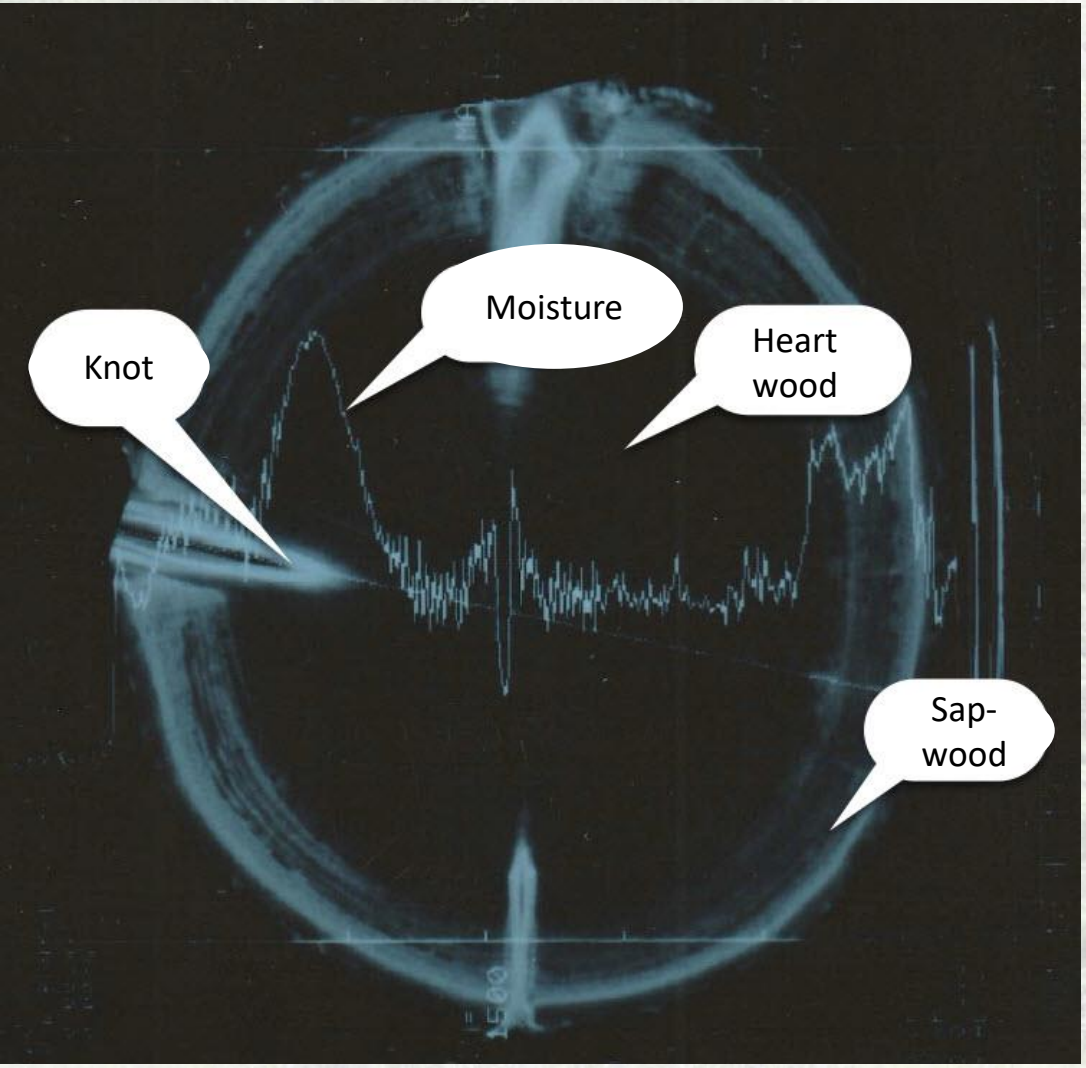
- The little ice age
  1450 - 1900
- Volcanic eruption 1783


Júlí 1966
2018
Planting began around 1900
Changes after livestock grazing stopped
Mynd: Einar Þ. Guðjohnsen og Hreinn

The story of timber inport to Iceland

- Timber import from Norway
- Prefab. houses from Norway
- Catalogue houses in Iceland
- Herring traders start buying timber from Russia
- Timber import from Canada
- Timber import from Baltic countries
- Now more and more timber are coming from Skandinavia

Classification of timber



Traits and characeristics of timber

Traits = genetic traits
What the individual is created for

Characeristics = care and environmental effects
What will become of the individual?

Classification of timber in Iceland

- Knowledge of timber grading in Iceland was based on knowledge from Norwegians and the Green Book.
- 1985 The building regulations were changed and all structural timber must be strength graded.
- Jan Buchter teacher from DTI came to Iceland to help.
- New standards came.
- Commercial Grading of Timber.

Classification of timber

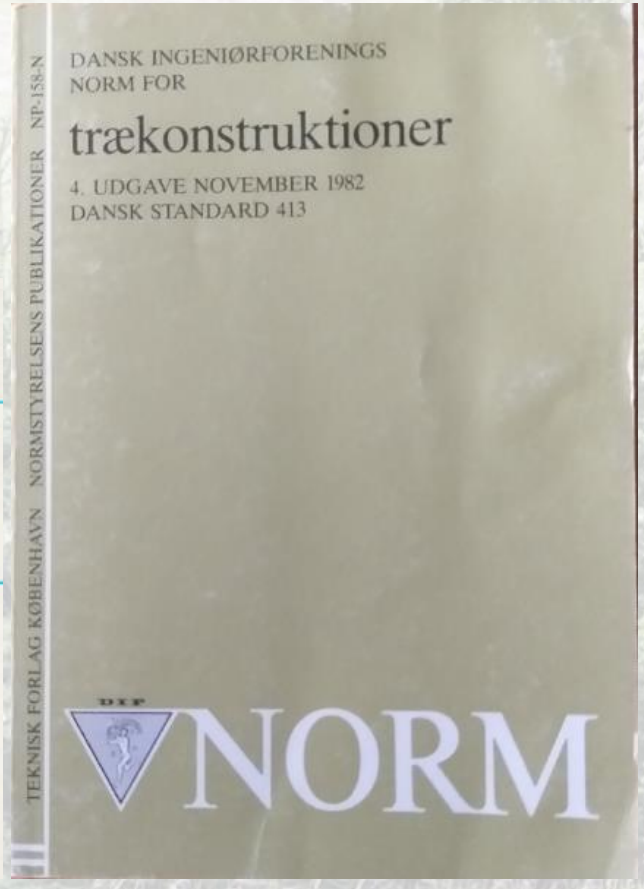
Two reasons for grading:

1. Strength grading of structural timber
2. Appearance grading


ow is the moment

Classification of timber

Strength grading of structural timber



Classification of timber

Appearance grading

EN 1611-1

Classification of timber

Strength classes
Assignment of timber grades

INSTA 142 Visual	EN 519/338 Mechanical	BS 4978 Visual
• T0	• C14	• GS
• T1	• C18	
• T2	• C24	• SS
• T3	• C30	

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

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

When we compare Strength and Commercial Grading the difference is one grade.
What is this difference? Commercial Grading is for appearance and the other for strength, and Strength graded timber can/may look ugly.

Classification of timber

Compare the knots sizes in timber size 50x150mm:
Strength grading class T2 – knots size is 25 mm.
Nordic Timber class OS – knots size is 30 mm.
EN1611-1 class G2-2 – knots size is 25 - 50 mm.
Commercial grading class OS lll – knots size is 15 - 20 mm.

Table 1: Quality specifications for pieces with thickness >45mm or with >70mm

Feature	T3	T2	T1	T0
Single knots	Edge: 1/3 of thickness Faces: 1/6 of width	Edge: 1/2 of thickness Faces: 1/4 of width but max 50 mm	Edge: 4/5 of thickness Faces: 2/5 of width but max 75 mm	Edge: 1/1 of thickness Faces: 1/2 of width
Splay knot with small angle to axis	Not accepted	Edge: As single knot, length maximun eqal to with of piece		Accepted
Knot cluster	Per piece: Maximum sum of knots equale to largest premitted face knot + largest permitted edge knot			
Knotst in squares	1/5 of side. max 50 mm	2/5 of side. max 50 mm	3/5 of side. max 50 mm	4/5 of side.

Nordiskt Trä

Virkesegenskaper			KLASS OS	KLASS V
Frisk kvist	**Virkestjocklek mm**	**Virkesbredd mm**	**Kviststorlek mm**	
Flatsidor	16-25	75-115	20	35
		125-150	25	40
		175-225	30	45
	32-38	75-115	25	40
		125-150	30	45
		175-225	35	50
	44-50	75-115	30	45
		125-150	35	50
		175-225	40	55
	63-75	75-115	35	50
		125-150	40	55
		175-225	45	60
Frisk kvist	**Virkestjocklek mm**		**Kviststorlek mm**	
Kantsidor	16-19		15	*
	22-25		20	*
	32-38		25	30
	44-50		30	40
	63-75		35	50
Andra kvistar	**Kvisttyp**		**Kvistreducering till % av frisk kvist**	
	Kvistgrupp, per kvist		70	70
	Torrkvist		70	70
	Barkringskvist		50	60
	Rötkvist		-	50

* lika med virkestiockleken

EN1611-1

Tabell 1 Kvistar.

	Särdrag		Virkesytans klass				
2-sidig sortering	Maximalt tillåtet per sämsta meter	2-sidig sortering[4]	G2-0	G2-1	G2-2	G2-3	G2-4
4-sidig sortering		4-sidig sortering	G4-0	G4-1	G4-2	G4-3	G4-4
	Flatsida		Kviststorlek 10 procent av bredden + [tabellvärde] (mm)				
	Frisk kvist		10	20	35	50	[6]
	Torr kvist		0	10	20	50	
	Barkringskvist		[1]	0	15	40	
	Röt- eller lös kvist		[1]	[1]	15	40	
			Kvistantal (st)				
	Sammanlagt		2	4	6	[3]	[6]
	Därav barkrings-, röt- och lös kvist		0	1 [2]	2	5	
	Därav horn- och bladkvist		0	4	6	[3]	
	Kantsida		Kviststorlek procent av tjocklek [5] (%)				
	Frisk kvist		50	90	100	100	[6]
	Torr kvist		33	67	75	100	
	Barkringskvist		[1]	33	50	90	
	Röt- eller lös kvist		[1]	[1]	50	90	
			Kvistantal (st)				
	Sammanlagt		1	2	4	[3]	[6]
	Därav barkrings-, röt- och lös kvist		0	1 [2]	2	3	

Största tillåtna kvist på flatsida är 10 procent av bredden + [tabellvärde] mm.
Kviststorlek 10 mm och mindre beaktas ej såvida de inte är rötkvistar eller lösa kvistar.
Genomgående kluven kvist på kantsida är tillåten i sort G4-2, G4-3 och G4-4.
Om sådan kvist är rötkvist, lös eller urfallen kvist tillåts den endast i G4-4.

Handelssorteringstabell 1 Kvistar.

	Virkesytans KLASS	OS I		OS II			OS III			
	Kvisttyp	Frisk kvist	Max. antal	Frisk kvist	Torr kvist	Max. antal	Frisk kvist	Torr kvist	Barkr. kvist	Max. antal
FLATSIDA	Antal kvistar per meter Vid max storlek:	1	1	2	1	3	3	3	1	5
	KVISTSTORLEK (mm) Vidtjocklek ≤ 29 mm		Summa Fk			Summa Fk				Summa Fk
	Vid bredd: – 115 mm	8	8	10	7	20	10	7	5	30
	116 – 150 mm	8	8	10	7	20	15	11	8	45
	151 – 200 mm	8	8	15	11	30	20	14	10	60
	201 – mm	8	8	15	11	30	25	18	13	75
	Vidtjocklek 30 – 39 mm									
	Vid bredd: – 115 mm	8	8	10	7	20	15	11	8	45
	116 – 150 mm	8	8	15	11	30	20	14	10	60
	151 – 200 mm	8	8	15	11	30	25	18	13	75
	201 – mm	10	10	15	11	30	30	21	15	90
	Vidtjocklek 40 – 59 mm									
	Vid bredd: – 115 mm	8	8	15	11	30	20	14	10	60
	116 – 150 mm	10	10	15	11	30	25	18	13	75
	151 – 200 mm	10	10	15	11	30	30	21	15	90
	201 – mm	10	10	20	14	40	35	25	18	105
	Vidtjocklek ≥ 60 mm									
	Vid bredd: – 115 mm	10	10	20	14	40	25	18	13	75
	116 – 150 mm	10	10	20	14	40	30	21	15	90
	151 – 200 mm	15	15	25	18	50	35	25	18	105
	201 – mm	15	15	25	18	50	40	28	20	120
KANTSIDA	Antal kvistar per meter Vid max storlek:	0	0	1	1	2	1	1	1	3
	KVISTSTORLEK procent av virkestjocklek									
	Vidtjocklek: 16 – 29 mm	0		40	28		50	35	25	
	30 – 100 mm	0		25	18		40	28	30	
	Procent av frisk kviststorlek				70			70	50	

Classification of timber

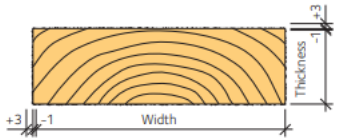
Dimensional tolerances for sawn timber

Permitted dimensional deviations for sawn timber are given in EN 1313-1.

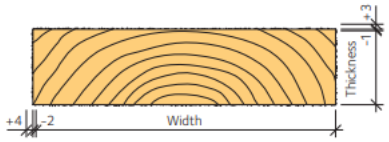
Definition	Requirement
Permitted deviation from target size.	Permitted upper and lower bounds of tolerance when + and – are different (dimension + s_1 / – s_2) mm. Target size at 20 % moisture content Thickness and width ≤ 100 mm: + 3 mm / – 1 mm Thickness and width > 100 mm: + 4 mm / – 2 mm The average current thickness and width of a timber batch should not be less than the target size.

Example

Thickness, target size = 50 mm
Maximal thickness = 50 + 3 = 53 mm
Minimal thickness = 50 – 1 = 49 mm
Length: No negative tolerance figure; positive tolerance to be set by contract or agreement.



Thickness and width ≤ 100 mm.

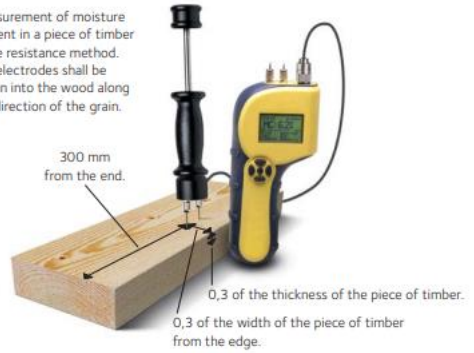


Thickness and width > 100 mm.

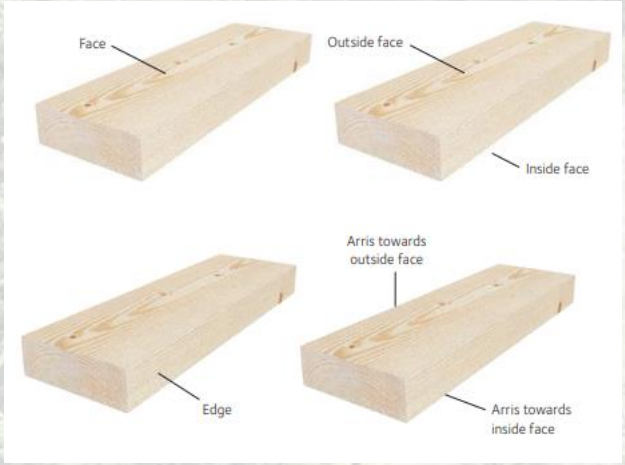
Moisture content

Definition	Measurement rule
The mass of the water present in a piece of timber, expressed as a percentage of the wood's mass in an absolutely dry state.	Measurement (estimation) is carried out with a calibrated electrical resistance moisture content meter with insulated hammer electrodes, or with a calibrated capacitance moisture content meter.

Measurement of moisture content in a piece of timber – the resistance method. The electrodes shall be driven into the wood along the direction of the grain.



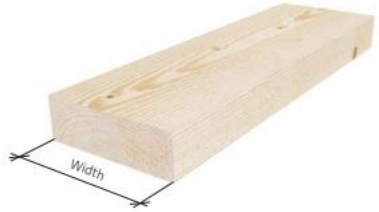
Measurement rule: The oven dry method, which is the most exact.



Width

Definition	Requirement	Measurement rule
Distance between the edges of a piece of timber at the specified place of measurement.	Width in mm at the specified moisture content.	Width is measured in the transverse direction, close to but at least 150 mm from both ends of the piece of timber, and at, at least one randomly selected point in between. Record only the smallest measured width.

Commonly occurring width values: 75, 100, 125, 150, 175, 200, 225 and 250 mm.



Length

Definition	Requirement	Measurement rule
The shortest distance between the ends of a piece of timber.	Length in mm or m at the specified moisture content.	Length is measured as the length of the largest possible rectangular parallelepiped (shape with parallel side surfaces) that can be inscribed in the piece of timber.

Commonly occurring timber lengths:
1 800 – 6 000 mm in 300 mm or 100 mm modules.

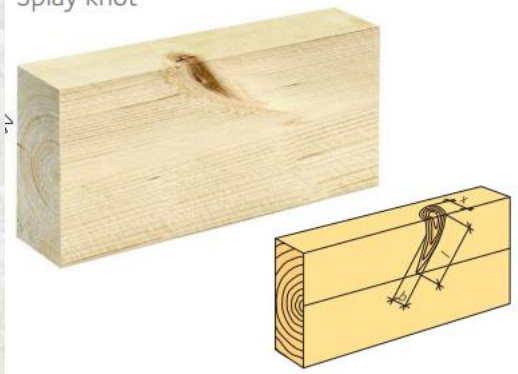
Thickness

Definition	Requirement	Measurement rule
Distance between the faces of a piece of timber at the specified place of measurement.	Thickness in mm at the specified moisture content.	Thickness is measured in the transverse direction, close to but at least 150 mm from both ends of the piece of timber, and at, at least one randomly selected point in between. Record only the smallest measured thickness.

Commonly occurring thickness values: 16, 19, 22, 25, 32, 38, 44, 47, 50, 63, 75 and 100 mm.

Classification of timber

Splay knot



Definition	Requirement	Measurement rule
A knot that has been cut through longitudinally on the inside face, splays towards the arris on the inside face, and is also partially exposed on the edge.	Face: Maximum size = [table value] mm. Maximum number on the worst metre.	Face: $d = (l + b) / 3$. b is measured at the middle.
	Edge: Maximum size = [table value] percent of thickness. Maximum number on the worst metre.	Edge: $d = x$. x is measured perpendicularly to the length of the piece of timber.

Traversing edge knot

Definition	Requirement
A split-through knot that runs across the edge from one face to the other.	Not permitted in GRADE US I – GRADE US IV.
	A sound knot is permitted in GRADE V, with a timber thickness of 16 – 29 mm.
	Permitted in GRADE VI.

Knots may/can have same names and nearly the same measurements, but the rules can be different.

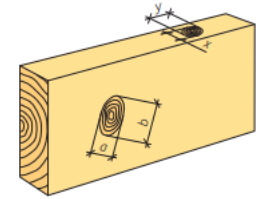
The same applies to features.

[Íðorðabankinn (www.arnastofnun.is)]

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.

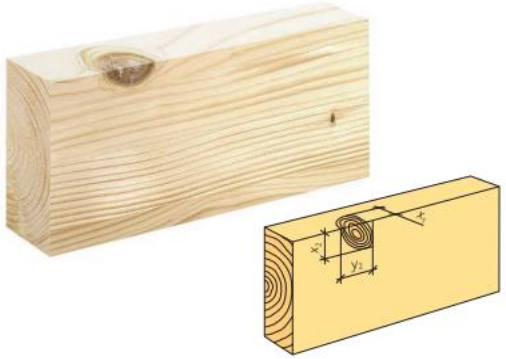
Measurement rules
Knots are measured according to their shape and location on the piece of timber. The following symbols are used for identification:
a = smallest diameter in mm.
b = largest diameter in mm.
d = knot size in mm.
x = dimension perpendicular to the length of the piece of timber in mm.
y = dimension parallel to the length of the piece of timber in mm.



Spike knot

Definition	Requirement	Measurement rule
A knot that has been cut through longitudinally on the inside face, so that the ratio between the largest and the smallest diameter is greater than 4, and that does not reach an arris.	Face: Maximum size = [table value] mm. Maximum number on the worst metre.	$d = (l + b) / 6$. b is measured at the middle.

Traversing arris knot



Definition	Requirement	Measurement rule
A knot that is exposed on an arris on the outside face of a piece of timber.	Face: Maximum size = [table value] mm. Maximum number on the worst metre.	Face: Average of width and length $d = (x_2 + y_2) / 2$.
	Edge: Maximum size = [table value] percent of thickness. Maximum number on the worst metre.	Edge: $d = x_1$. x_1 is measured perpendicularly to the length of the piece of timber.

Not traversing arris knot

Definition	Requirement	Measurement rule
A knot that is exposed on an arris on the inside face of a piece of timber.	Face: Maximum size = [table value] mm. Maximum number on the worst metre.	Face: Average of width and length $d = (x_2 + y_2) / 2$.
	Edge: Maximum size = [table value] percent of thickness. Maximum number on the worst metre.	Edge: $d = x_1$. x_1 is measured perpendicularly to the length of the piece of timber.

Oval knot

Definition	Requirement	Measurement rule
A knot that has been cut more or less straight through, so that the ratio between the largest and smallest diameter is greater than 1,5 but no more than 4.	Face: Maximum size = [table value] mm. Maximum number on the worst metre.	Face: Average of the largest and smallest diameter $d = (a + b) / 2$.
	Edge: Maximum size = [table value] percent of thickness. Maximum number on the worst metre.	Edge: $d = x$. x is measured perpendicularly to the length of the piece of timber.

Classification of timber

Scar - Broken

Scar (3.31)	Permitted in width up to 1/5 of the width of the piece and in length up to three times the width of the piece. Through going not permitted.

Knots

Single knots	Edge: Not more than 4/5 of the thickness. Face: Not more than 2/5 of the width.

Classification of timber

Check

Checks,not through the piece (aggregated length)	Checks with a depth less than half the thickness of the piece are permitted without limitation. Permitted up to 1,5 m in length or 1/2 of the length of the piece, whichever less. Not permitted if intersecting an arris.

Curly Grain – Compression Wood

Top rupture and curly grain	Permitted up to 1/2 of the width of the piece. Not permitted in the outer 1/4 of the width.
Compression wood (3.11)	Not permitted if the shape of the piece of timber is expected to be significantly affected as the piece dries. Else permitted to the extent as given below. Not more than 10 % of the cross-sectional area.

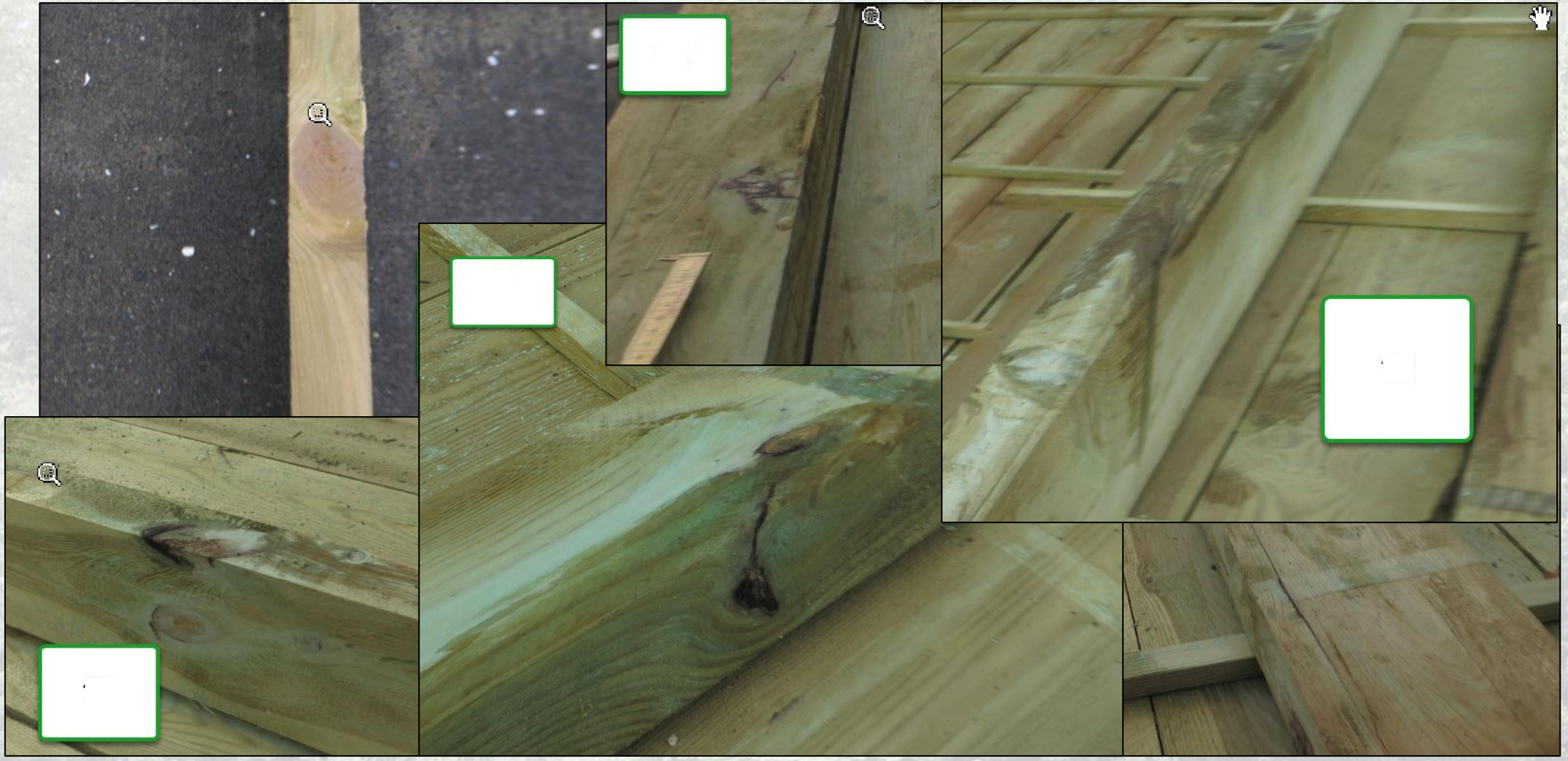
tim

Classification of timber

Checks	
	
Checks,not through the piece (aggregated length)	Checks with a depth less than half the thickness of the piece are permitted without limitation. Permitted up to 1,5 m in length or 1/2 of the length of the piece, whichever less. Not permitted if intersecting an arris.

Checks	
	
Checks,not through the piece (aggregated length)	Checks with a depth less than half the thickness of the piece are permitted without limitation. Permitted up to 1,5 m in length or 1/2 of the length of the piece, whichever less. Not permitted if intersecting an arris.

Classification of timber



Certification and Warranty

In 2023 we will start classes in the classification of timber in distance learning.

In one course, we teach appearance classification and strength classification. And we will teach it in several stages.

The buildings authorities (HMS) have agreed to manage this teaching and therefore grant the rights.

Certification and Warranty

Those who will benefit from this program are:

- **Rights acquisition:** Companies that need rights to strength classify timber
- **Colleges and Polytechnics**
- **Carpenters and company employees in the construction sector and shops**

Everyone who goes to this program takes an intermediate exam, but those students who take the rights acquisition take a final exam in strength classification of timber and get the right to grade timber.

Certification and Warranty

CE marking on timber is to ensure that timber that is transported between countries and is strength graded is graded according to EUROPEAN regulations.

We Icelanders, will not be able to export timber for the next 20-40 years. We should be able to ensure that timber that is graded for building construction will be under the supervision of the building authorities and the required knowledge.

Certification and Warranty

[English | Svanurinn – Norræna umhverfismerkið]

Just as we depend on forests, forests depend on us. At the Forest Stewardship Council® (FSC®) we unite citizens, businesses, governments, and NGOs under a common goal: protecting healthy, resilient forests for all, forever.

NORDIC SWAN ECOLABEL

THE OFFICIAL ECOLABEL OF THE NORDIC COUNTRIES

In Iceland, the Environment Agency (Umhverfisstofnun) is responsible for the management of the Nordic Swan Ecolabel. Employees of the EA process applications for the ecolabel, perform audits and support companies applying for the label. Additionally, the EA works with marketing and awareness raising about the Nordic Swan Ecolabel as well as the EU Ecolabel.

Certification and Warranty

We have started to produce timber and timber products.

We will not be competitive with imports until 40-60 years from now.

Mjóanes on Héraði.
Ca. 50 year ago planting started.