

KVH®

Structural Timber

Duobalken® and Triobalken®

**Glued Solid Timber and
Glue Laminated Timber**



Stora Enso

The renewable materials company

Part of the bioeconomy, Stora Enso is a leading provider of renewable solutions in packaging, biomaterials, wooden constructions and paper on global markets.

We believe that everything that is made from fossil-based materials today can be made from a tree tomorrow. Our materials are renewable, reusable and recyclable, and form the building blocks for a range of innovative solutions that can help replace products based on fossil fuels and other non-renewable materials.

With carbon captured in the wood, the products offer a truly sustainable means of combating climate change.

Stora Enso products are entirely made from renewable wood, sourced from sustainably managed forests. The wood supply chains to Stora Enso's Wood Products units are covered by a third-party certified wood traceability system.

Contents

KVH® (structural timber)	4
General information / Highlights	4
Overview of product features	5
Standard dimensions	6
Quality criteria	7
Duobalken®, Triobalken® and Glued Solid Timber (glue laminated timber products).....	8
General information / Highlights	8
Overview of product features	9
Product definition	10
Standard dimensions	11
Quality criteria	12
Contact	13

This brochure is a summarised version of the technical KVH® structural timber folder. Please refer to the folder for more information about the references to sources.

See also: [storaenso.com/woodproducts/kvh](https://www.storaenso.com/woodproducts/kvh)
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KVH® Structural Timber by Stora Enso

– The solution for sophisticated modern structures

The safest and easiest way to be certain that you are using the right timber for modern and resource efficient timber structures is to use KVH® structural timber.

In collaboration with other Institutes, the Supervisory Board for structural timber (Überwachungs-gemeinschaft Konstruktionsvollholz e. V.) has drafted requirements and defined these in an agreement to form the basis for production and supply.

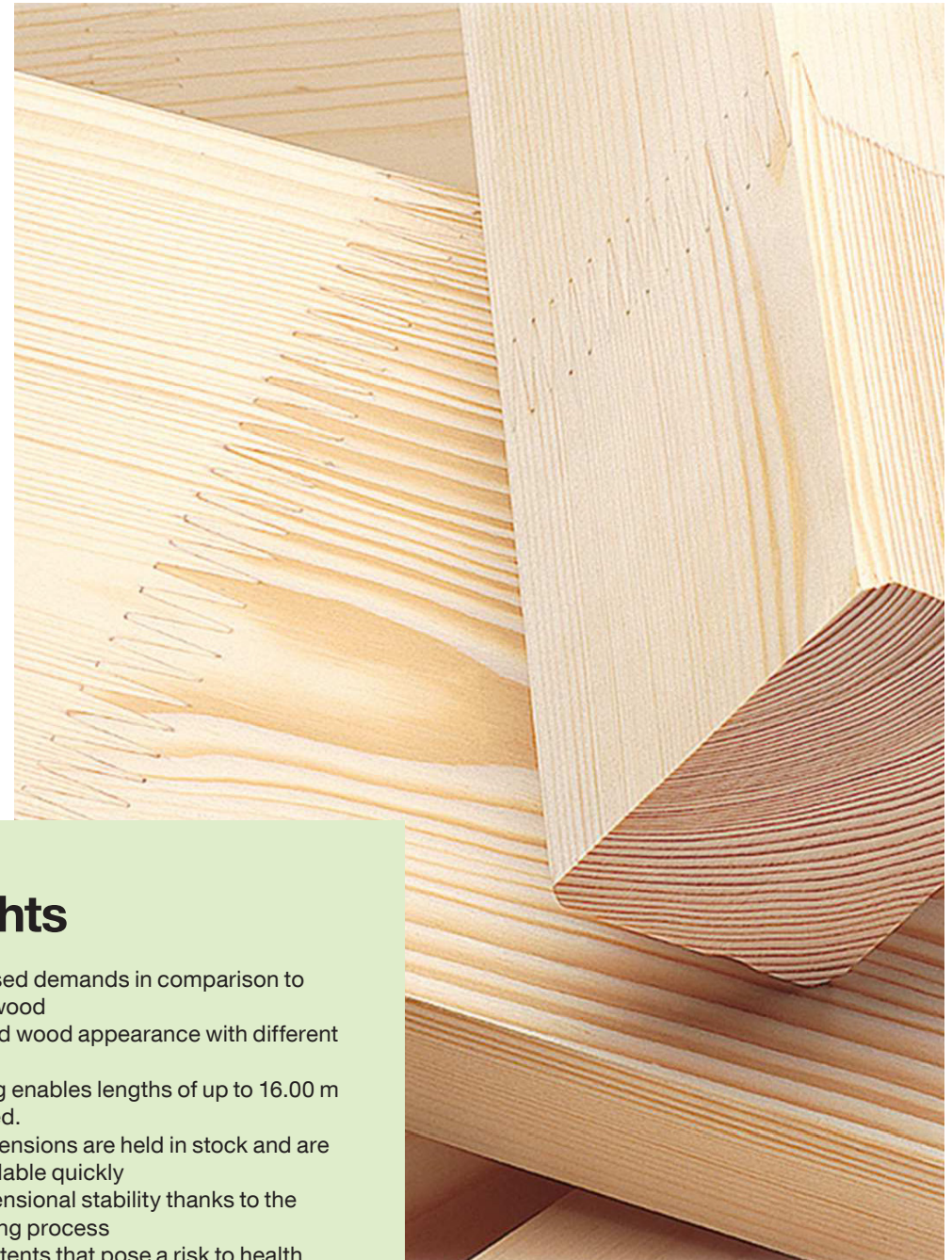
Therefore, KVH® structural timber complies with additional requirements which exceed the general building inspectorate guidelines.

KVH® structural timber is a technically-dried, strength-graded and generally finger-jointed solid wood product made from softwood (mainly spruce) and designed for a wide variety of applications in modern timber construction.

Precisely-defined product characteristics, requests for resource efficient supporting frameworks and attractive surfaces coupled with fast delivery times to the site of use are further good reasons to use KVH® structural timber.

Highlights

- Meets increased demands in comparison to normal solid wood
- Attractive solid wood appearance with different surfaces
- Finger-jointing enables lengths of up to 16.00 m to be produced.
- Preferred dimensions are held in stock and are therefore available quickly
- Superior dimensional stability thanks to the technical drying process
- Free from contents that pose a risk to health



Overview of product features

KVH® structural timber by Stora Enso is a quality-controlled product with clearly defined characteristics that satisfy the requirements of EN 15497 (for finger-jointed solid wood) and EN 14081 (for non-finger-jointed solid wood).

Depending on the intended use, we manufacture two ranges which essentially differ only in terms of their visual appearance:

- KVH®-Si for visible areas
- KVH®-NSi for non-visible structures

During the grading process — a crucial requirement for ensuring the appropriate use of KVH® structural timber in construction — the timber is subject to quality criteria which significantly exceed those stipulated for customary sawn structural timber: The timber is graded according to EN 14081 and DIN 4074 and is monitored externally.

In addition to the requirements set by these standards, the following grading criteria are also met:

- Defined wood moisture content
- Type of cut (free of heart)
- Dimensional stability of the cross-sections
- Surface properties

All grading characteristics and conditions can be found in the “KVH® structural timber by Stora Enso – Quality Criteria”.

Dimensional stability through the technical drying process

To minimize the deformation of timber and the associated adverse effects on structures caused by shrinking and swelling, an average wood moisture content of 15 % ± 3 % has been set for KVH® structural timber. At Stora Enso, this value is precisely set by a technical drying process in computer-controlled drying kilns, and each individual piece of timber is checked prior to processing.

Variable lengths achieved through finger-jointing

Finger jointing enables lengths of up to 16.00 m of timber to be produced. The process involves bonding together individual sections without this affecting the strength value of the whole component.



Adhesives used

KVH® structural timber by Stora Enso is using formaldehyde-free adhesives.

KVH® structural timber area of application

Finger-jointed KVH® structural timber may be used in usage classes 1 and 2 in accordance with EN 1995-1-1 (Eurocode 5) in structures which are not subject to fatigue. Non-finger-jointed KVH® structural timber may also be used in usage class 3.

Standard dimensions

KVH® structural timber is produced in standard cross-sections to cover virtually all the requirements of modern timber construction.

The advantages of standardization for trade and the wood processing industry speak for themselves:

- produced as stock
- short delivery times
- economic planning and construction

Our current warehouse information is available upon request. Further dimensions can be provided upon request or are available as Duobalken® and Triobalken® laminated beams.

The maximum weight per package is 3 tonnes.

KVH® Dimensions in NSi quality²

Standard length: 5 m and 13 m (up to 16 m possible)

Wood species: WW/Spruce

Width (mm)	Height (mm)											
	60	80	100	120	140	160	180	200	220	240	260	280
40	X¹	X¹	X	X	X	X	X	X		X		
piece / package	180	130	110	90	80	70	60	50		40		
50		X¹	X	X	X	X	X	X				
piece / package		104	88	54	64	56	48	40				
60	X¹	X	X	X	X	X	X	X	X	X	X	X
piece / package	126	91	77	63	56	49	42	35	35	28	28	28
80		X	X	X	X	X	X	X	X	X	X	X
piece / package		65	55	45	40	35	30	25	25	20	20	20
100			X	X	X	X	X	X	X	X	X	X
piece / package			44	36	32	28	24	20	20	16	16	16
120				X	X	X	X	X	X	X	X	X
piece / package				27	24	21	8	15	15	12	12	12
140					X	X	X	X	X	X		
piece / package					24	21	18	15	15	12		

1) Not graded to S10/C24. Further dimensions possible – upon request.

2) Si quality upon request.

Range of KVH® by Stora Enso*

KVH® Standard:

Package consisting of one cross section and on grade in a defined packaging unit.

KVH® System-Length:

Packages with system length like. 7 m, 7.5 m, 8 m, 8.5 m, 9 m one cross section and on grade in a defined packaging unit.

*Others available upon request.

Quality criteria

Requirements to be met by KVH® structural timber in accordance with the supervisory Board of structural timber (Überwachungsgemeinschaft Konstruktionsvollholz e.V.) and in accordance to DIN 4074.

Grading Criteria	Requirements KVH® - Si	Requirements KVH® - NSi	Comments
Technical standard	EN 15497 EN 14081		Finger jointed timber Non finger jointed timber
Strength class¹ (acc. EN 338)	Min. C24	Min. C25	Important properties (strength, stiffness and density) needed for dimensioning acc. EN 1995-1-1
Grading standard	DIN4074	DIN4074	Assignment of visual grading standards acc. EN 1912
Moisture Content	15 % ± 3 %	15 % ± 3 %	Technically dried at minimum 55° C –The specified wood moisture content is a pre-requisite for dispensing, for the most part, with preservative treatments, and also the precondition for gluing
Type of cut	The cut is made taking into account the fact that on an ideally formed log, the pith is cut through with two-strand cutting.		For KVH®-Si the cutting of a centreboard is possible (≥ 40 mm) upon request
Wane (acc. DIN 4074)	Not permitted	≤ 10% of the smaller side of the cross section permitted	
Dimension stability of the cross section (acc. EN 336)	Tolerance class 2: d/b < 100 mm: ± 1.0 mm d/b ≥ 100 mm: ± 1.5 mm		The Tolerance of the stability of the length needs to be defined, principally no negative deviations permitted
Knot conditions	Loose and dead knots are not permitted; occasionally faulty knots or part of knots up to max. 20 mm Ø are permitted	Acc. DIN 4074	
Knot diameter ratio	Acc. DIN 4074 (e.g. S10/C24: A ≤ 2/5, not more than 70 mm)		Knot ratio A, determined acc. DIN 4074
Ingrown bark	Not permitted	Acc. DIN 4074	
Cracks, radial shrinkage cracks (dry cracks)	Crack-width b ≤ 3% of the width of the surface	Acc. DIN 4074	KVH®-Si full fills higher needs as the requirements acc. S10/C24, DIN 4074
Resign pocket	Width b ≤ 5 mm		Additional criteria
Discolouration	Not permitted	Acc. DIN 4074	KVH®-Si full fills higher needs as the requirements acc. S10/C24, DIN 4074
Insect damage	Not permitted	Acc. DIN 4074	KVH®-Si full fills higher needs as the requirements acc. S10/C24, DIN 4074
Twist	Acc. DIN 4074	Acc. DIN 4074	The permissible extent of twisting is not specified in further detail as no unacceptable twisting should be expected if all the other criteria are complied with
Crook	Acc. DIN 4074 (free of heart center cutting ≤ 4 mm/2 m)	Acc. DIN 4074	KVH®-Si full fills higher needs as the requirements acc. S10/C24, DIN 4074
End finishing	Trimmed perpendicular	Trimmed perpendicular	
Surface properties	Planed and chamfered	Levelled and chamfered	
Packaging	Per package 4 sides green wrap (single pieces upon request 4 sides black wrap)	Per package 4 sides green wrap	White wrap upon request
Marking	Marked on surface		
Certificates	Certificates can be sent on request – or downloaded from storaenso.com		

1) Higher strength class upon request.

Duobalken® and Triobalken® Glued Solid Timber and Glue Laminated Timber by Stora Enso

Glued solid timber are particularly suitable for average-sized solid wood cross-sections (beam dimensions of less than 30 cm) where there are strict requirements for a natural solid wood appearance without noticeable joints of numerous individual lamellas.

Glued solid timber involving 2 (Duobalken®), 3 (Triobalken®) or up to maximum 5 lamellas which are glued face wise together.

Glued solid timber and glue laminated timber are produced in accordance to EN 14080.

Part of the possible variety of sizes and special cross-sections can also be produced in accordance with the general building inspectorate approval Z-9.1-440.

By finger-jointing, lengths of up to 16.00 m can be produced.

Finally, the form stability and targeted low wood moisture content make the product particularly suitable for exposed ceiling beams, rafters or purlin roofs, including in visible areas.

Hardly any difference is noticeable when combined with KVH® structural timber as the visual appearance and aesthetic qualities of the products are very similar.

Highlights

- For dimensionally stable timber construction
- Excellent value for money
- Greater rigidity compared to solid wood with the same strength class
- Attractive appearance
- Use in visual and non-visual areas

Overview of product features

General

Glued solid timber according to EN 14080 is defined by two to max. five equally large and homogeneously sorted and assembled individual cross sections with lamella thicknesses greater than 45 mm to max. 85 mm. The maximum possible cross section is 280 x 280 mm.

Glue laminated timber according to EN 14080 is defined by at least 2 lamellas with thicknesses equal to or greater than 6 mm to max. 45 mm.

Duobalken®, Triobalken® or glued solid timber, other than regulated according to EN 14080, can be manufactured according to the general building inspectorate approval Z-9.1-440, considering defined lamellae- and cross-sectional dimensions.

A standard length of 13 m ensures logistical handling and enables tailored cutting on site. System lengths cover a large part of the intermediate lengths and are manufactured individually.

Technical Standard

For laminated timber, the minimum requirements according to EN 14080 apply to the production.

The general building inspectorate approval Z-9.1-440 with corresponding standards references applies to beams not regulated in EN 14080.

In addition, increased requirements apply as specified in the agreement of the KVH surveillance community.

This is also used for all laminated timber cross sections.

Dimensional Stability due to technical drying-process

In order to minimize deformation of the wood and the associated adverse consequences for a construction due to shrinkage or swelling, an average wood moisture of 12 % ± 2 % (max. 15 %) is specified.

At Stora Enso, this value is precisely set by means of technical drying in computer-controlled drying chambers and checked in every single piece before processing.

Adhesive

Gluing with a melamine adhesive leads to a bond quality that meets the requirements of usage classes 1 and 2 according to EN 301.

Surface Quality

The surface is planed and chamfered on 4 sides as standard. For visible use, the bars are subjected to an additional optical selection during raw material assessment and in production. If necessary, minor defects are reworked. This means that two qualities are available: non visible (NSi) and visible (Si).

No chemical wood preservation required

Due to the technical drying in the manufacturing process and with a constant low wood moisture, an infestation by wood-destroying fungi and insects can be ruled out – considering the structural framework – chemical wood protection can be dispensed with.

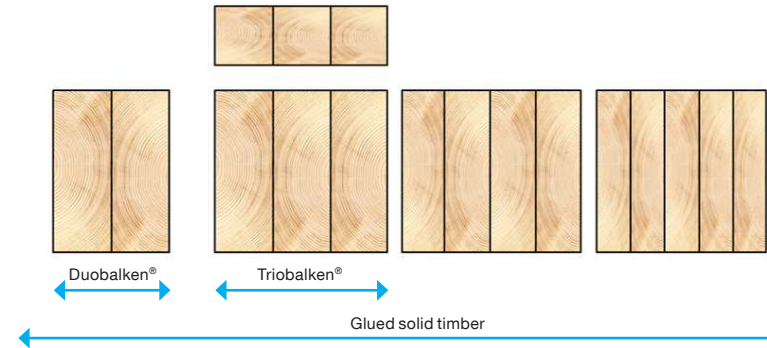
Areas of application

Applications are regulated by EN 1995-1-1.



Product definition

In order to standardize the applicability and availability within this possible range of dimensions, you will find a list of standard cross sections that are manufactured on the following pages. Other cross sections and glulam are possible on request.



No. of lamellae	2	3	4	5
acc. EN 14080*	Glued Solid Timber (max. cross section)			
Beam	170 x 280 mm	255 x 280 mm	280 x 280 mm	280 x 280 mm
Lamellae	85 x 280 mm	85 x 280 mm	70 x 280 mm	56 x 280 mm

*Thickness of Lamellae \leq 45 mm or a higher number of lamellae corresponds to glue laminated timber acc. EN 14080 upon request.

acc. Z.9.1-440	Duobalken®	Triobalken®	Comments
Beam	160 x 280 mm	240 x 280 or 100 x 360 mm	Deviations from EN 14080 such as: max. lamellae cross sections, separating cuts, strength composition, etc. are regulated in Z-9.1-440
Lamellae	80 x 280 mm	80 x 280 or 100 x 120 mm	

Wood species, strength values and values of structural-physical properties

Technical Characteristics	KVH®	Duobalken® / Triobalken®
Wood species*		WW / Spruce
Strength class acc. EN 14081		Min C24 (S10)
Moisture Content u_m	15 % \pm 3 %	\leq 15 %
Swelling and Shrinkage ratio		0.24 % per 1 % change in moisture content
Class acc. EN 13501-1		D-s2, d0
Thermal conductivity value λ		0.13 W/(mK)
Water vapor diffusion resistance factor μ		40

*Other wood species upon request.

Standard dimensions

Duobalken®, Triobalken® and glued solid timber are manufactured in standard cross-sections. A variety of different dimensions can be carried out for modern wooden house construction.

The advantages of standardization for retailers and processors:

- Manufacture as stock goods for delivery in packages
- Short delivery time
- Economic planning and execution

Current stock information is available on request.

Duobalken®, Triobalken®, Glued Solid Timber and Glue Laminated Timber by Stora Enso*

KVH® Standard:

Package consisting of one cross section and on grade in a defined packaging unit.

KVH® System-Length:

Packages with system length like 7 m, 7.5 m, 8 m, 8.5 m, 9 m one cross section and on grade in a defined packaging unit.

*Other lengths available upon request.

Standard dimension: Duobalken®, Triobalken®, Glued Solid Timber and Glue Laminated Timber *

Standard length:	13 m (up to 16 m possible)
Surface:	NSi (Si upon request)
Wood species:	WW / Spruce

Width (mm)	Height (mm)									
	100	120	140	160	180	200	220	240	260	280
100 piece / package	x 44	x 36	x 32	x 28	x 24	x 20	x 20	x 16		
120 piece / package		x 27		x 21	x 18	x 15	x 15	x 12		
140 piece / package			x 24	x 21	x 18	x 15		x 12		
160 piece / package				x 14		x 10		x 8		x 8
180 piece / package					o 12	o 10		o 8		
200 piece / package						o 10		o 8		o 8

*Other cross sections or length upon request. Legend: x = 2-Lamellae, o = 3 Lamellae.

Quality criteria

Duobalken[®], Triobalken[®], Glued Solid Timber and Glue Laminated Timber

Requirements for Duobalken[®] and Triobalken[®] in accordance with the general building inspectorate approval Z.9.1-440 of the German Institute for Building Technology and the agreement in accordance with the monitoring regulations of the surveillance association for solid construction timber e.V.

Grading Criteria	Requirements to Laminated BEAM, Glulam, Duobalken [®] and Triobalken [®]		Comments
	Si	NSi	
Technical standard	EN 14080 or technical approval Z-9.1-440		(Finger joints in Lamellae acc. EN 14080)
Strength class ¹ (acc. EN 338)	Min C24		Important properties (strength, stiffness and density) needed for dimensioning acc. EN 1995-1-1
Grading standard	DIN 4074		Assignment of visual grading standards acc. EN 1912
Moisture Content ²	Max. 15 %		Technically dried at minimum 55°C – the specified wood moisture content is a pre-requisite for dispensing, for the most part, with preservative treatments, and also the precondition for gluing
Type of cut	The cut is made taking into account the fact that on an ideally formed log, the pith is cut through with two-strand cutting		For KVH [®] -Si the cutting of a centreboard is possible (≥ 40mm) upon request
Wane (acc. DIN 4074)	Not permitted		The right (closer to pith) surface of lamellae outside
Dimension stability of the cross section (acc. EN 336)	Tolerance class 2: d/b < 100 mm: ± 1.0 mm d/b ≥ 100 mm: ± 1.5 mm		The Tolerance of the stability of the length needs to be defined, principally no negative deviations permitted
Knot conditions	Loose and dead knots are not permitted; occasionally faulty knots or part of knots up to max. 20 mm Ø are permitted Acc. DIN 4074		
Knot diameter ratio	Acc. DIN 4074 (e.g. S10/C24: A ≤ 2/5, not more than 70 mm)		Knot ratio, determined acc. DIN 4074
Ingrown bark	Not permitted		
Cracks, radial shrinkage cracks (dry cracks)	Crack width b ≤ 2 % (max. 4 mm) of the width of the surface Acc. DIN 4074		Si full fills higher needs as the requirements acc. S10/C24 nach DIN 4074
Resin pocket	Width b ≤ 5 mm		
Discolouration	Not permitted	Acc. DIN 4074	
Insect damage	Not permitted	Acc. DIN 4074	
Twist	≤ 4 mm/2 m		{S10 acc. DIN 4074 ≤ 8 mm/2 m}
Crack	≤ 4 mm/2 m		{S10 acc. DIN 4074 ≤ 8 mm/2 m}
End finishing	Trimmed perpendicular		
Surface properties	Planed and chamfered	Levelled and chamfered	The right (closer to pith) surface of lamellae outside
Packaging	Per package 4 sides green wrap (single pieces upon request 4 sides black wrap)	Per package 4 sides green wrap	White wrap upon request
Marking	Marked on surface		
Certificates	Certificates can be sent on request – or downloaded from storaenso.com		

1) Higher strength classes upon request.

2) According "Überwachungsbestimmungen der Überwachungsgemeinschaft Konstruktionsvollholz e.V."; Deviations according to EN14080 permitted for laminated beams and glulam.



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