



KVH[®] structural timber
by Stora Enso
Duobalken[®]
Triobalken[®]



Stora Enso

Doing good for people and our planet

Stora Enso is a leading provider of renewable solutions in paper, packaging, biomaterials and wooden constructions on global markets. Our aim is to replace fossil-based materials by innovating and developing new products and services based on wood and other renewable materials. In 2015, the company recorded sales of €10 billion and employed some 26,000 staff in over 35 countries. Stora Enso shares are listed on the Helsinki and Stockholm stock exchanges.

Stora Enso's Wood Products division provides versatile wood-based solutions for building and housing. Our product range covers all areas of urban construction including solid-wood elements, housing modules, pellets and wood components. Our portfolio is rounded off by a range of sawn timber products. Our customers are mainly construction and joinery companies, wholesalers and retailers. The Wood Products division operates globally and has more than 20 production units in Europe.

Rethink is our company philosophy. It encourages us to think differently about the way we live our lives and inspires us to find ways to improve our world with renewable solutions.

Our core values — remain at the forefront of innovation and conduct business ethically — underpin everything we do. These values must always comply with local laws and regulations and at the same time should help us have a positive impact on people and their communities beyond the local level.

Our company vision — doing good for people and their planet — expresses our ultimate goal. All our endeavours are guided by a well thought-out and responsible strategy. We strive to improve this world, its communities and the lives of everyone that comes into contact with us through our products, activities and services.





Photo: Regnauer Hausbau

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KVH[®] structural timber by Stora Enso

Structural timber: The solution for sophisticated modern structures

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

In collaboration with the Association of German Carpenters (Bund Deutscher Zimmermeister – BDZ) in the Central Association of the German Building Trade (Zentralverband des Deutschen Baugewerbes e.V.), the Supervisory Board for Structural Timber (Überwachungsgemeinschaft 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. Alternative types of softwood are also available for special uses, such as for thresholds or for outdoor areas not directly exposed to the elements.

Precisely-defined product characteristics, requests for filigree 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.
- Customised production is possible at short notice, e.g. “custom order KVH[®] structural timber”.
- 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 DIN EN 15497:2014 (for finger-jointed solid wood) and DIN EN 14081-1 (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 4074-1 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” table below.

Dimensional stability through the technical drying process

To minimise 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.

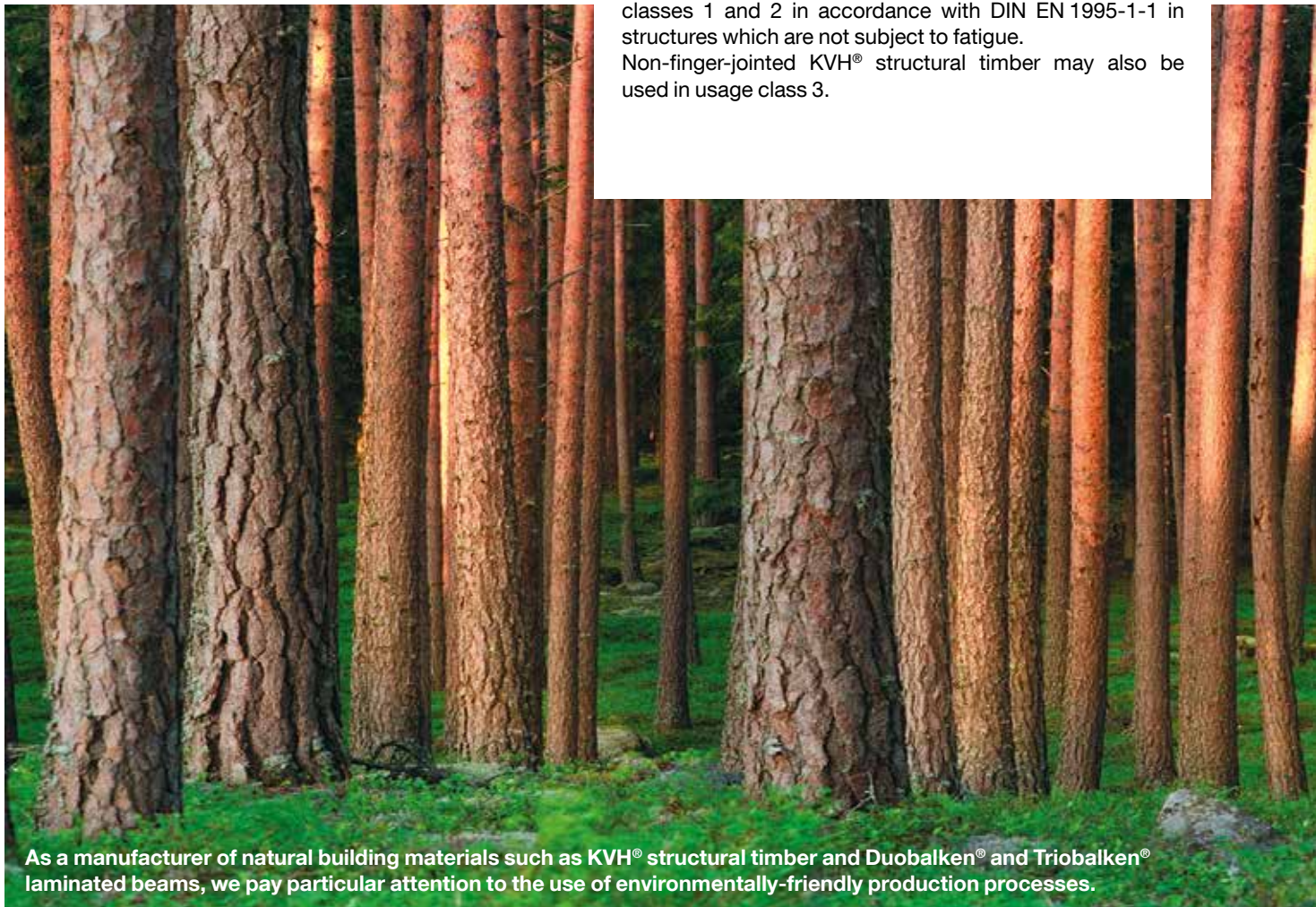
Adhesives used

KVH® structural timber by Stora Enso is also outstandingly environmentally-friendly. It is bonded using formaldehyde-free adhesives, making it an extremely environmentally-friendly and safe product.

KVH® structural timber area of application

Finger-jointed KVH® structural timber may be used in usage classes 1 and 2 in accordance with DIN EN 1995-1-1 in structures which are not subject to fatigue.

Non-finger-jointed KVH® structural timber may also be used in usage class 3.



As a manufacturer of natural building materials such as KVH® structural timber and Duobalken® and Triobalken® laminated beams, we pay particular attention to the use of environmentally-friendly production processes.

Standard dimensions

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

Whether you require a standard, trimmed or custom order, you decide which of the available versions is best suited to your purposes.

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

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

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

The maximum weight per package is 3 tons.

Our Pfarrkirchen plant is also optimised for maximum flexibility. Custom orders from customers can be produced quickly and accurately, and are also trimmed.


For this purpose, the end of every piece of timber can be labelled, showing the component number(s), cross-section, length and other details.


Trimming is performed on standard industry machines. Therefore, you can send your data to us electronically.




































































Standard dimensions for KVH® structural timber in NSi and Si quality

Standard length: 5.00 m and 13.00 m (up to 16.00 m is possible)

Species of wood: spruce

 order-based manufacturing

 goods held in stock

| Width (mm) | Height (mm) | | | | | | | | | | | |
|-----------------------------|--|--|--|---|---|---|---|--|---|---|---|---|
| | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 |
| 40 piece/package |  ¹⁾ 180 |  ²⁾ 130 |  ²⁾ 110 |  90 |  ²⁾ 80 |  70 |  ²⁾ 60 |  50 |  50 |  40 | | |
| 50 piece/package | |  ³⁾ 104 |  88 |  54 |  64 |  56 |  ³⁾ 48 |  40 |  ³⁾ 40 |  32 | | |
| 60 piece/package |  ¹⁾ 126 |  91 |  77 |  63 |  56 |  49 |  42 |  35 |  35 |  28 |  28 |  28 |
| 80 piece/package | |  65 |  55 |  45 |  40 |  35 |  30 |  25 |  25 |  20 |  20 |  20 |
| 100 piece/package | | |  44 |  36 |  32 |  28 |  24 |  20 |  20 |  16 |  16 |  16 |
| 120 piece/package | | | |  27 |  24 |  21 |  18 |  15 |  15 |  12 |  12 |  12 |
| 140 piece/package | | | | |  24 |  21 |  18 |  15 |  15 |  12 | | |

¹⁾ Dimensions 40 × 60 mm and 60 × 60 mm are only available in the standard length of 5.00 m and are not S10TS/C24-graded.

²⁾ Dimensions 40 × 80/100/140/180 mm only possible with calculated measurement 43 mm.

³⁾ Dimensions 50 × 80/180/220 mm only possible with calculated measurement 53 mm.

Additional dimensions are technically possible but only upon request; visible quality (Si) possible in preferred dimensions.



Custom order KVH® structural timber

The wide range of standard dimensions with widths starting from 60 mm and heights of up to 280 mm satisfy the majority of general requirements for KVH® structural timber. Standardised lengths of 13.00 m ensure comprehensive availability at short notice while allowing customised use of goods held in stock for any cut length. In addition, it can be beneficial and more economical for certain areas of application to use custom order KVH® structural timber. In this case, the lengths can be produced quickly and accurately and trimmed and packaged (with right alignment) according to customer requirements. This eliminates the need for order-picking or repackaging in carpentry shops or interim storage facilities, as the timber required for a specific project is directly available without loss of length or loss of time.

Individual pieces of timber are optimised in terms of length and, if required, joined together in multiple lengths, whereby the possible lengths of individual pieces of timber range between 3.00 and 16.00 m. Detailed information about package content and, where applicable, the multiple lengths of joined individual beams is printed on labels on the front of the piece, and also on packaging label.

A range of available special dimensions and intermediate dimensions, tried and tested production processes, individual delivery cycles (i.e. specified with the customer) and the diverse assortment of KVH® structural timber leave little to be desired.

Ranges of KVH® structural timber by Stora Enso

- KVH® standard:**
 Package consisting of one cross-section and one grade in a defined packaging unit.
- KVH® structural timber system lengths:**
 Package with one system length of for example 7.00 m, 7.50 m, 8.00 m, 8.50 m or 9.00 m, with a uniform dimension and quality (NSi, Si).
- Custom order KVH® structural timber:**
 Optimised list of different cross-sections available in multiple lengths.

Produced according to DIN EN 15497:2014 (finger-jointed solid wood) and EN 14081-1 (non-finger-jointed solid wood)



Custom order package with labels on the front of each piece

Packaging label with detailed information



KVH® structural timber by Stora Enso

Quality criteria

Requirements to be met by KVH® structural timber in accordance with the inspection regulations and the agreement between the Association of German Carpenters (Bund Deutscher Zimmermeister – BDZ) and the Supervisory Board for Structural Timber (Überwachungsgemeinschaft Konstruktionsvollholz e. V.).

| Grading criterion | Requirement to be met by KVH®-Si | Requirement to be met by KVH®-NSi | Comments |
|---|--|--|---|
| Technical standard | DIN EN 15497:2014 DIN EN 14081:-1 | DIN EN 15497:2014 DIN EN 14081:-1 | Finger-jointed solid wood Non-finger-jointed solid wood |
| Strength class according to DIN EN 338 | At least C24 | At least C24 | The strength, rigidity and bulk density properties decisive for the load-bearing capacity are derived for dimensioning purposes according to Eurocode 5 from DIN EN 338, table 1 and DIN EN 1995-1-1/NA |
| Grading standard for visual grading | DIN 4074-1 | DIN 4074-1 | The elastomechanical properties according to DIN EN 338 can be found in the table on page 13. |
| Wood moisture content | 15% ± 3% Technically dried: timber which is dried in a suitable, process-controlled plant at a temperature of T ≥ 55°C for at least 48 hours to a wood moisture content of u ≤ 20%. | 15% ± 3% | The specified wood moisture content is a prerequisite for dispensing, for the most part, with preservative treatments, and can also be the precondition for finger-joint assembly. |
| 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. | | |
| Wane in accordance with DIN 4074-1 | Not permitted | ≤ 10% of the smaller cross-section side | |
| Dimensional stability of the cross-section | DIN EN 336 Dimensional stability class 2: w ≤ 100 mm: ±1.0 mm w > 100 mm: ±1.5 mm | DIN EN 336 Dimensional stability class 2: w ≤ 100 mm: ±1.0 mm w > 100 mm: ±1.5 mm | The dimensional stability for the longitudinal dimensions must be agreed between the customer and supplier. |
| Knot condition | Loose knots and dead knots are not permitted. Occasional faulty knots or parts of knots up to max. 20 mm in diameter are permitted. | DIN 4074-1 Grading class S10 | Replacement with natural wood dowels is permitted. |
| Knot diameter ratio | S10: A ≤ ⅓ Not exceeding 70 mm | S10: A ≤ ⅓ Not exceeding 70 mm | Knot diameter ratio A is determined in accordance with DIN 4074-1. The following applies to mechanical grading: <ul style="list-style-type: none"> • Knot sizes are not taken into consideration for KVH®-NSi. • For KVH®-Si, A ≤ ⅓ applies. |
| Ingrown bark | Not permitted | DIN 4074-1 | |

| Grading criterion | Requirement to be met by KVH®-Si | Requirement to be met by KVH®-NSi | Comments |
|---|---|--|---|
| Cracks, radial shrinkage cracks (dry cracks) | Width of the crack $w \leq 3\%$ of the respective cross-section width | DIN 4074-1 | For Si, the requirements are stricter than those applicable to grading class S10 in accordance with DIN 4074-1. |
| Resin pockets | Width $w \leq 5$ mm | — | Additional criterion |
| Discolourations | Not permitted | DIN 4074-1 | For Si, the requirements are stricter than those applicable to grading class S10 in accordance with DIN 4074-1. |
| Insect damage | Not permitted | DIN 4074-1 | For Si, the requirements are stricter than those applicable to grading class S10 in accordance with DIN 4074-1. |
| Twisting | DIN 4074-1 | DIN 4074-1 | 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. |
| Longitudinal warping | For free of heart cutting: ≤ 8 mm/2 m For heart-free cutting: ≤ 4 mm/2 m | For free of heart cutting: ≤ 8 mm/2 m | In comparison: According to DIN 4074-1 S10: ≤ 8 mm/2 m |
| Finishing of the ends | Trimmed perpendicular | Trimmed perpendicular | |
| Surface properties | Planed and chamfered | Levelled and chamfered | |
| Packaging | Packages wrapped over four sides in green film; upon request Si-quality individual beams can be wrapped in (black) film | Packages wrapped over four sides in green film | Additional feature for KVH® by Stora Enso |
| Marking | All qualities are marked once on the narrow face (ink jet printer). | | Additional feature for KVH® by Stora Enso |
| Certificates | All Stora Enso certificates can be sent to you on request. | | |



Duobalken[®] and Triobalken[®] laminated beams and glued laminated timber by Stora Enso



Glued laminated timber is 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.

This involves gluing together at least two, and at most five, individual cross-sections — generally produced according to DIN EN 14080:2013 — by their face sides with the grain running parallel. 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. Where there are two lamellas, this is referred to as Duobalken[®] laminated beams, and where there are three lamellas, this is referred to as Triobalken[®] laminated beams.

By finger-jointing the glued laminated timber, 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 and 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

It is possible to glue together up to five similar-sized individual cross-sections with the same strength class and a maximum thickness of 80 or 85 mm to form Duobalken® and Triobalken® laminated beams or glued laminated timber with dimensions of max. 240 × 280 mm (according to Z-9.1-440) or 280 × 280 mm (according to DIN EN 14080:2013). Further dimensions are possible in accordance with the general building inspectorate approval Z-9.1-440.

A standard length of 13.00 m ensures logistical manageability and can be cut to size on site in line with the customer's needs. System and special lengths cover the majority of intermediate lengths and are individually machined. Preferred cross-sections also ensure quick availability.

Technical standards

The minimum requirements according to DIN EN 14080:2013 generally apply to the production of glued laminated timber. For Duobalken® and Triobalken® laminated beams which are not regulated by DIN EN 14080:2013, the general building inspectorate approval Z-9.1-440 continues to apply with corresponding references to standards.

Particularly with regard to minimizing cracking and deformations from shrinkage caused by drying, stricter requirements regarding limiting the wood moisture content, dimensional stability and appearance also apply. These points are specified in the agreement between the Supervisory Board for KVH® structural timber and the Association of German Carpenters (Bund Deutscher Zimmermeister – BDZ) for Duobalken® and Triobalken® laminated beams. They also apply accordingly to all glued laminated timber cross-sections.

Dimensional stability through the technical drying process

To minimise the deformation of timber and the associated adverse effects on structures caused by shrinking or swelling, an average timber moisture content of 12% ± 2% has been set for Duobalken® and Triobalken® laminated beams and glued laminated 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.

Adhesives used

Duobalken® and Triobalken® laminated beams and glued laminated timber are glued with melamine adhesives, making them extremely environmentally-friendly and safe products.

Surface qualities

Duobalken® and Triobalken® laminated beams and glued laminated timber are planed and chamfered on four sides as standard. Beams used in visible areas are specially selected during evaluation of the raw materials and during production. If necessary, any small faults are reworked. Thus, two different surface quality classes are available: non-visible (NSi) and visible (Si). More information can be found in the following table which lists the corresponding quality criteria.

No chemical wood preservation required

Thanks to the technical drying process during production and given the continuously low wood moisture content, taking prevailing construction conditions into account, there is no danger of Duobalken® and Triobalken® laminated beams or glued laminated timber being infested by wood-destroying mould or insects, and chemical wood preservation is not necessary.

Should the structure require the use of chemical wood preservation, approved impregnation agents are available.

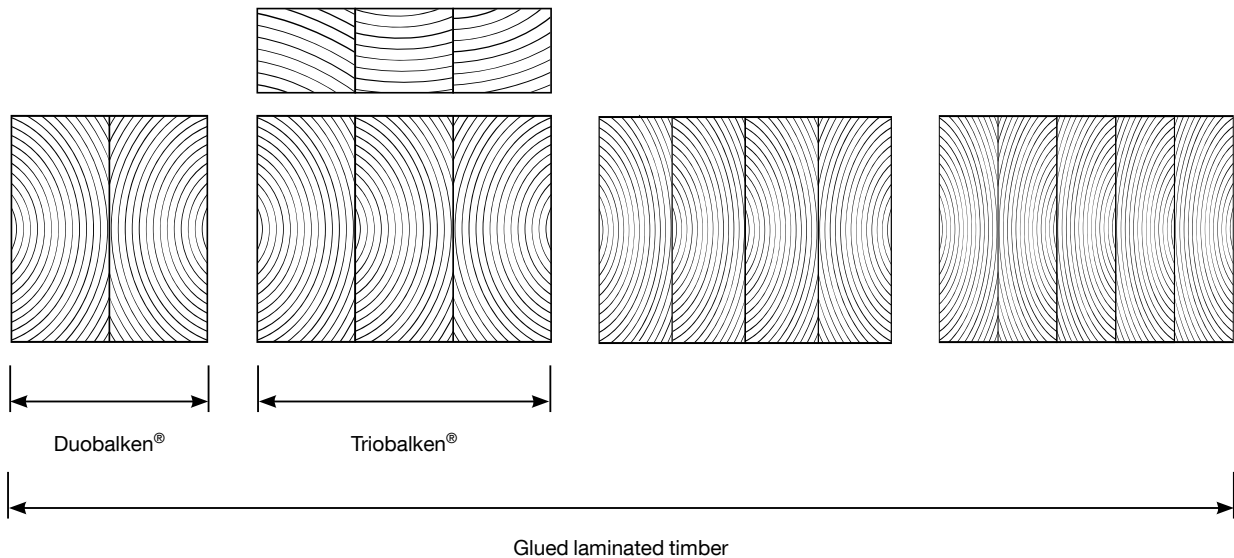
Areas of application

National rules concerning the use of glued laminated timber (e.g. DIN 20000-3 for Germany) must be observed. In addition, finger-jointed Duobalken® and Triobalken® laminated beams and glued laminated timber are limited to usage classes 1 and 2 in accordance with EN 1995-1-1. Thus, attention must be paid to an average wood moisture content of max. 20% in the assembled state (moisture content in the building material at a temperature of 20°C and relative humidity of the ambient air may only exceed 85% for a few weeks per year).





Production and applicability are subject to national regulations which may deviate from one another. For this reason, Duobalken® and Triobalken® laminated beams and glued laminated timber are currently produced as shown below. To standardise the applicability and availability within this possible variety of sizes, the next pages provide a list of standard cross-sections which are either held in stock or order-based.



| Number of lamellas | 2 | 3 | 4 | 5 |
|--|--------------|---------------------------------|--------------|--------------|
| in accordance with approval Z-9.1-440 | Duobalken® | Triobalken® | not possible | not possible |
| max. overall dimension | 160 × 280 mm | 240 × 280 mm or 100 × 360 mm | — | — |
| max. lamella dimension | 80 × 280 mm | 80 × 280 mm or 100 × 120 mm | — | — |

| in accordance with DIN EN 14080:2013 | Glued laminated timber | | | |
|--------------------------------------|------------------------|--------------|--------------|--------------|
| max. overall dimension | 170 × 280 mm | 255 × 280 mm | 280 × 280 mm | 280 × 280 mm |
| max. lamella dimension | 85 × 280 mm | 85 × 280 mm | 70 × 280 mm | 56 × 280 mm |

Pieces of timber which are multiple-bonded in accordance with EN 14080:2013 with lamella thicknesses of ≤ 45 mm are referred to as glued laminated timber.

Standard dimensions

Duobalken® and Triobalken® laminated beams and glued laminated timber are produced in standard cross-sections and can be used, in particular, to construct structures with cross-sections exceeding the usual KVH structural timber cross-section range.

It is possible to call-off finished products held in stock at the Stora Enso Ždírec plant. In addition, fixed lengths of individual beams can also be ordered from a preferred series of cross-sections.

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

Upon request, we will be delighted to send you information on our current stocks. Other dimensions are available upon request.


- **Produced as stock**
For packaged deliveries and preferred series for precise delivery (individual beams)
- **Short delivery times**
- **Economic planning and construction**
















































Order-based standard dimensions for Duobalken® and Triobalken® laminated beams in NSi und Si quality

Standard length: 13.00 m (up to 16.00 m possible)

Species of wood: spruce

Order-based manufacture of:  NSi (non-visible)

 NSi (non-visible) and Si (visible quality)

| Width (mm) | Height (mm) | | | | | | | | |
|---------------|---|---|--|---|---|--|---|---|---|
| | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 |
| 60 |  |  |  |  |  |  |  |  |  |
| piece/package | 91 | 77 | 63 | 56 | 49 | 42 | 35 | 35 | 28 |
| 80 |  |  |  |  |  |  |  |  |  |
| piece/package | 65 | 55 | 45 | 40 | 35 | 30 | 25 | 25 | 20 |
| 100 | |  |  ¹ |  |  |  |  |  |  |
| piece/package | | 44 | 36 | 32 | 28 | 24 | 20 | 20 | 16 |
| 120 | | |  | |  |  |  |  |  |
| piece/package | | | 27 | | 21 | 18 | 15 | 15 | 12 |
| 140 | | | |  |  |  ² |  | |  |
| piece/package | | | | 24 | 21 | 18 | 15 | | 12 |
| 160 | | | | |  | |  | |  |
| piece/package | | | | | 14 | | 10 | | 8 |
| 180 | | | | | |  |  |  |  |
| piece/package | | | | | | 12 | 10 | 10 | 8 |
| 200 | | | | | | |  | | |
| piece/package | | | | | | | 10 | | |
| 240 | | | | | | |  | |  |
| piece/package | | | | | | | 8 | | 4 |

¹⁾ Only possible with calculated measurement 100 × 140 mm.

²⁾ Only possible with calculated measurement 140 × 200 mm.


Visible quality (Si): high-quality product for optically demanding areas such as visible ceiling beams, rafters and log house beams.






















Standard dimensions held in stock for Duobalken® and Triobalken® laminated beams in NSi und Si quality

Standard length: 13.00 m (up to 16.00 m possible)

Species of wood: spruce

Goods held in stock:

 goods held in stock (NSi or Si)

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

Species of wood, strength values and mathematical values of structural-physical properties

| Technical characteristics | KVH® structural timber | Duobalken® and Triobalken® |
|--|--|--|
| Species of wood ¹ | | Spruce ¹ / fir, pine, larch |
| Strength classes according to DIN EN 338, definitive values according to DIN EN 14080:2013 or the general building inspectorate approval Z-9.1-440 | | at least C24 or C24M ²⁾ |
| Mean value of modulus of elasticity parallel to the grain | $E_{0,mean}$ 11,000 N/mm ² | 11,000 N/mm ² (11,600 N/mm ²) ³⁾ |
| Wood moisture content u_m | 15% ± 3% | ≤ 15% |
| Swelling and shrinkage ratio | 0.24% per 1% change in wood moisture content | |
| Building material class in accordance with DIN 13501-1 | D-s2, d0 | |
| Thermal conductivity calculation value λ | 0.13 W/(mK) | |
| Water vapour diffusion resistance factor μ | 40 | |

¹⁾ Species of wood which are not printed in bold are available on request but have longer delivery times; other softwood types are permitted, but not generally used.

²⁾ M = machine graded.

³⁾ The value in brackets applies to glued laminated timber according to approval Z-9.1-440.

DIN 18334 "German construction contract procedures (VOB), Part C: General technical specifications in construction contracts (ATV) – Carpentry and timber construction works" stipulates a maximum wood moisture content of 18% for timber frame houses. Duobalken® and Triobalken® laminated beams and glued laminated timber satisfy this requirement without any problems.

Duobalken® and Triobalken® laminated beams by Stora Enso

Standard:

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

System lengths:

Package with one system length of for example 7.00 m, 7.50 m, 8.00 m, 8.50 m or 9.00 m, with a uniform dimension and quality (NSi, Si).

Individual beams:

Preferred series of cross-sections which guarantees precise availability.

Individual lengths of Duobalken® and Triobalken® laminated beams and glued laminated timber by Stora Enso

The availability of Duobalken® and Triobalken® laminated beams and glued laminated timber as individual lengths, together with our storage facilities offer flexibility, quick availability and technical advantages.

In accordance with the approval, increased structural values can be calculated for Duobalken® and Triobalken® laminated beams. Instead of the mean value of modulus of elasticity parallel to the grain of 11,000 N/mm² for KVH® structural timber, 11,600 N/mm² can be calculated. Duobalken® and Triobalken® laminated beams are therefore equivalent to glued laminated timber with strength class GL24h.

We also offer these products in individual lengths so that you can exploit this advantage to the full.

We keep rough sawn beams in stock and freshly plane them just before delivery to guarantee a perfect surface.



Individual lengths of Duobalken® and Triobalken® laminated beams in visible quality

Ex-stock

In packages (see pages 10 and 11)

- dimensions held in stock and sold individually
- planed-down cross-section of the next largest dimension, dimension should be calculated as next largest standard size

| Width (mm) | Length [m] | Height (mm) | | | | | | | |
|------------|------------|-------------|-----|-----|-----|-----|-----|-----|-----|
| | | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 |
| 100 | 13 m | ● | ● | ● | ● | ● | ● | ● | ● |
| | 10 m | — | — | — | ● | ● | ● | ● | ● |
| 120 | 13 m | — | ● | ● | ● | ● | ● | ● | ● |
| | 10 m | — | — | — | ● | ● | ● | ● | ● |
| 140 | 13 m | — | — | ● | ● | ● | ● | ○ | ● |
| | 10 m | — | — | — | — | — | ● | ○ | ● |
| 160 | 13 m | — | — | — | ● | — | ● | — | ● |
| | 10 m | — | — | — | — | — | ● | — | ● |
| 180 | 13 m | — | — | — | — | ● | — | — | — |
| 200 | 13 m | — | — | — | — | — | ● | — | — |

Individually wrapped in film upon request

Minimum purchase: 1 piece (combined with other products in a full lorry)

Quality criteria of Duobalken® and Triobalken® laminated beams and glued laminated timber

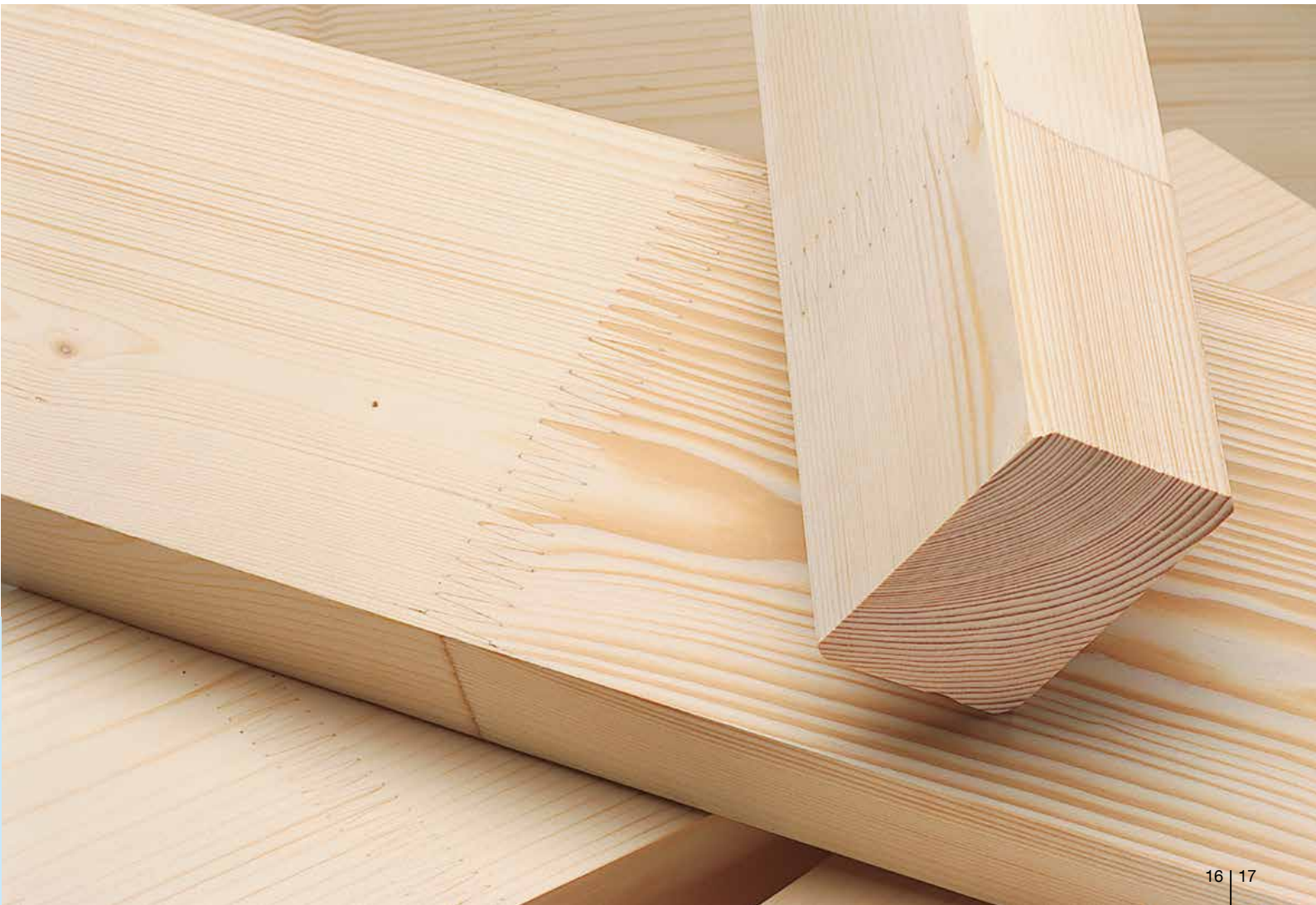
Requirements to be met by Duobalken® and Triobalken® in accordance with the general building inspectorate approval Z-9.1-440 of the German Institute for Structural Engineering and the agreement on Duobalken® and Triobalken® laminated beams.

| Grading criterion | Requirements to be met by Duobalken® and Triobalken® laminated beams | | Comments |
|--|---|---|---|
| | in visible areas | in non-visible areas | |
| Technical standard | DIN EN 14080:2013-09 or the general building inspectorate approval Z-9.1-440 | | |
| Strength class according to DIN EN 338 | At least C24 or C24M | | The strength, rigidity and bulk density properties decisive for the load-bearing capacity are derived from DIN EN 14080:2013 or the general building inspectorate approval Z-9.1-440. |
| Wood moisture content u_m | Maximum 15% | | Prerequisite for bonding |
| Dimensional stability of the cross-section | DIN EN 336 – Dimensional stability class 2 w ≤ 100 mm: ±1.0 mm w > 100 mm: ±1.5 mm | | The dimensional stability for the longitudinal dimensions must be agreed between the customer and supplier. |
| Twisting | ≤ 4 mm/2 m | | In comparison to DIN 4074-1 S10: ≤ 8 mm/2 m |
| Longitudinal warping | ≤ 4 mm/2 m | | In comparison to DIN 4074-1 S10: ≤ 8 mm/2 m |
| Finishing of the ends | Trimmed perpendicular | | |
| Lamella dimensions (Duobalken® and Triobalken®) | Lamella thickness: max. 80 mm Lamella height: max. 280 mm | | According to Z-9.1-440 Special lamella dimensions up to 100 × 120 mm |
| Lamella dimensions (glued laminated timber) | Lamella thickness: min. 45 mm and max. 85 mm Lamella height: max. 280 mm | | According to EN 14080:2013 |
| Surface properties | Planed and chamfered | Levelled and chamfered | The right-hand sides (sides next to the heart) must face outwards. |
| Bonding of timber including finger-jointing | According to DIN EN 14080:2013 or the general building inspectorate approval Z-9.1-440 | | |
| Packaging | Packages wrapped over four sides in green film. Upon request, Si-quality individual beams wrapped in (black) film. Upon request, can also be wrapped over three sides in film (protective cover). | Packages wrapped over four sides in green film. | Additional feature for Duobalken® and Triobalken® and glued laminated timber by Stora Enso |
| Marking | All qualities are marked once on the narrow face (ink jet printer). | | Additional feature for Duobalken® and Triobalken® and glued laminated timber by Stora Enso |
| Certificates | All Stora Enso certificates can be sent to you upon request. | | |

Usage classes

| Usage classes according to EN 1995-1-1 | Usage class according to DIN 68800 | Example of typical application | Use of KVH®, Duobalken® and Triobalken® and glued laminated timber |
|---|---|--|--|
| SC 1 – dry area Average wood moisture content ≤ 12% | GK 0 GK 1 where accessible to insects | Component enclosed on all sides and heated | KVH®, Duobalken®, Triobalken® and glued laminated timber (all species of wood) |
| SC 2 – Susceptible area Average wood moisture content ≤ 20 % | GK 2 if temporary moistening is possible | protected components of a car port structure | KVH®, Duobalken® and Triobalken® made from larch or Douglas fir heartwood, or KVH® without finger-jointing |
| SC 3 – External area Average wood moisture content > 20 % | GK 3 for outside areas exposed to weather | unprotected components, balcony structures* | KVH® without finger-jointing made from larch or Douglas fir heartwood ¹ |

¹⁾ The additional requirement for preservative treatment for GK 3 must be decided on a case-by-case basis.
If required, we will be happy to treat KVH®, Duobalken® and Triobalken® and glued laminated timber for you.



Log house beams by Stora Enso

For some people, log houses are the most exclusive kind of wooden house and represent the most comfortable way to live. They offer a wide range of architectural possibilities, a permanent relationship and direct contact with wood as a natural material and much more besides — and we provide the ideal material to build them: Log house beams by Stora Enso.

Log house beams made from glued solid timber are manufactured in a wide range of dimensions and design variants and from the most diverse species of wood according to the application, dimension and construction requirements. Glued log house beams particularly offer various advantages when it comes to twisting and warping, along with optimised setting behaviour due to the low moisture content of the wood required for surface gluing. Solid wood cross-sections are preferred for relatively narrow areas of use with small cross-sections and for less important, unexposed buildings.

Log house beams are S10TS/C24-graded in accordance with EN 14081 and DIN 4074-1, and are glued in a way that makes them weatherproof. Environmentally-friendly, formaldehyde-free adhesive is used for finger-jointing while melamine resin is used for surface gluing.

A comprehensive self- and third-party monitoring programme simultaneously guarantees consistently high quality, and this applies across the range, from off-the-shelf raw timber to bundled construction kits.

Standard dimensions of 60 × 100 mm to 160 × 240 mm are suitable for a wide range of applications from summer houses to high-quality residential buildings. Standard lengths of 13.00 m

and project-related production of lengths of up to 16.00 m enable continuous wall structures for all common building dimensions.

Here, narrow and thin cross-sections are predominantly used for less important building purposes, such as summer houses or shelters.

Medium-sized cross-sections are particularly suitable for buildings, such as holiday homes and garages, etc.

Cross-sections with larger dimensions are designed for multi-layered wall constructions of permanently inhabited buildings.

Special cross-sections, such as those for single layered, solid wall constructions of houses, are manufactured specially for the property and adjusted to suit the specific application.

Duobalken® laminated beams with tongue and groove formation are also ideal for use as surface-forming ceiling beams.

Log houses offer unrivalled cosiness.



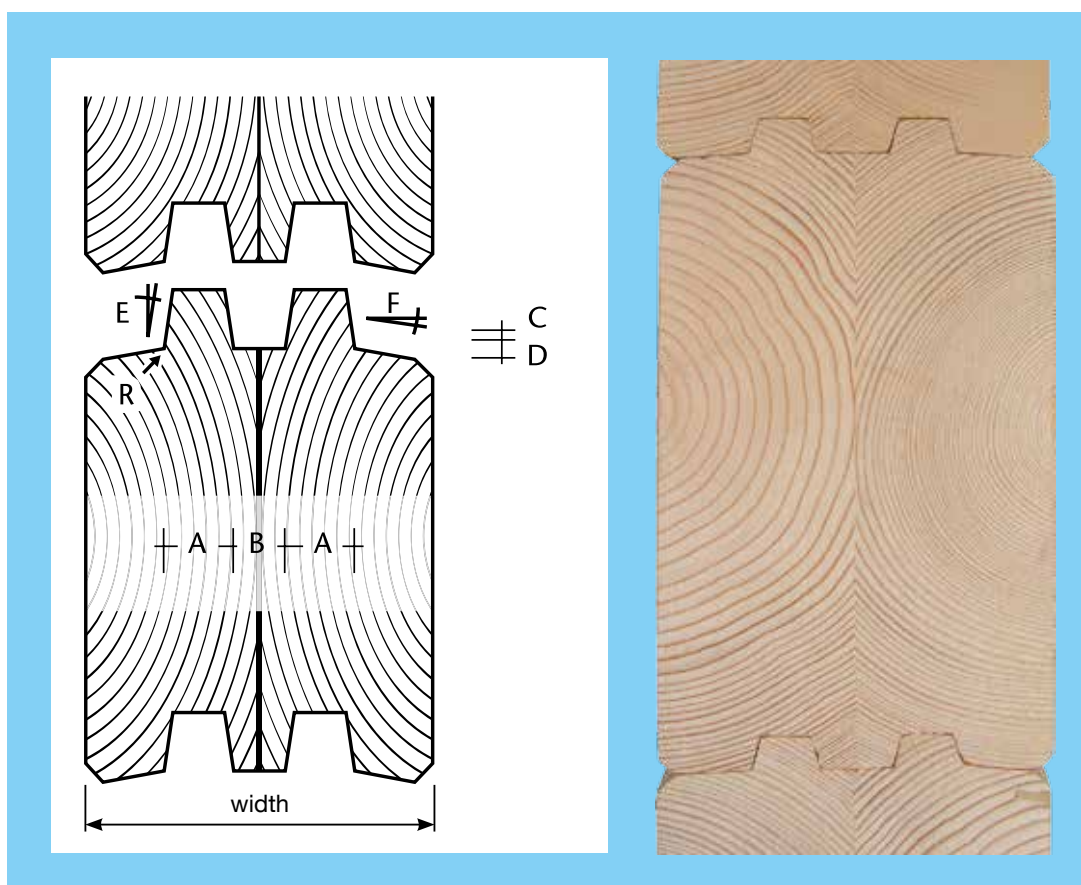
Standard cross-sections of log house beams

The following standard products and cross-sections are available:

| Height h profile dimension (incl. tongue) in mm | KVH® | Duo- balken® | Trio- balken® | Width w ¹ [mm] | n-number (tongue and groove ²) | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | F [mm] | R [mm] |
|--|------|-----------------|------------------|------------------------------|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 120-240 | ● | ● | | 60 | 2 | 15 | 10 | 0.9 | 3 | 15° | 5° | R1 |
| 120-240 | ● | ● | | 80 | 2 | 15 | 10 | 1.6 | 3 | 15° | 5° | R1 |
| 140-240 | ● | ● | | 100 | 2 | 15 | 15 | 1.6 | 3 | 15° | 5° | R1 |
| 160-240 | | ● | ● | 120 | 2 | 15 | 20 | 1.5 | 3 | 15° | 5° | R1 |
| 200-240 | | ● | ● | 140 | 3 | 20 | 20 | 1.5 | 5 | 15° | 5° | R1 |
| 200-240 | | ● | ● | 160 | 3 | 20 | 20 | 2.4 | 5 | 15° | 5° | R1 |

¹⁾ Width w available in the specified standard widths, intermediate sizes available upon request

²⁾ Groove: 11 mm; tongue: 10 mm



Alternatively, Cross Laminated Timber – CLT by Stora Enso can be used for solid wood constructions.

For more information, go to www.clt.info





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