Laminated and glued products

Duobalken® and Triobalken® laminated beams and glued laminated timber

Glued laminated timber is particularly suitable for medium-sized solid wood cross-sections where there are strict requirements for a natural solid wood appearance.

This involves gluing together at least two, and at most five, individual cross-sections, generally produced according to DIN EN 14080:2013. Part of the possible variety of sizes and special cross-sections can also be produced in accordance with the general building authority approval Z-9.1-440. Duobalken® laminated beams have two lamellas, Triobalken® laminated beams have three lamellas and glued laminated timber has up to nine lamellas.

By finger-jointing the glued laminated timber, lengths of up to 16.00 m can be produced. Not least because of the form stability and the deliberately low moisture content of the wood, the product is particularly suitable for exposed ceiling beams and rafters or purlin roofs, also in visible areas. Hardly any difference is noticeable when combined with KVH® structural timber, since the visual appearance and aesthetic qualities of the products are similar.

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

Holzwerke Pfarrkirchen

Overview of product features

Up to five individual cross-sections of the same size, strength class and thickness of 85 mm are glued together to form a laminated beam with a maximum dimension of 280x280 mm (according to EN 14080:2013).
In addition, Duobalken®, Triobalken® and laminated beams can be produced in accordance with the building authority approval (Z-9.1-440).
A standard length of 13.00 m ensures logistical manageability and can be cut to size on site. 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 authority approval Z-9.1-440 continues to apply with corresponding references to standards.

Particularly regarding the minimisation of cracking and deformations due to 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 deformation of the wood and the associated adverse effects on structures caused by shrinking or swelling, a wood moisture content of 12% ± 2% has been specified for Duobalken®, Triobalken® and laminated beams. At Holzwerke Pfarrkirchen, 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 ecologically sound and toxicologically harmless.

Surface qualities

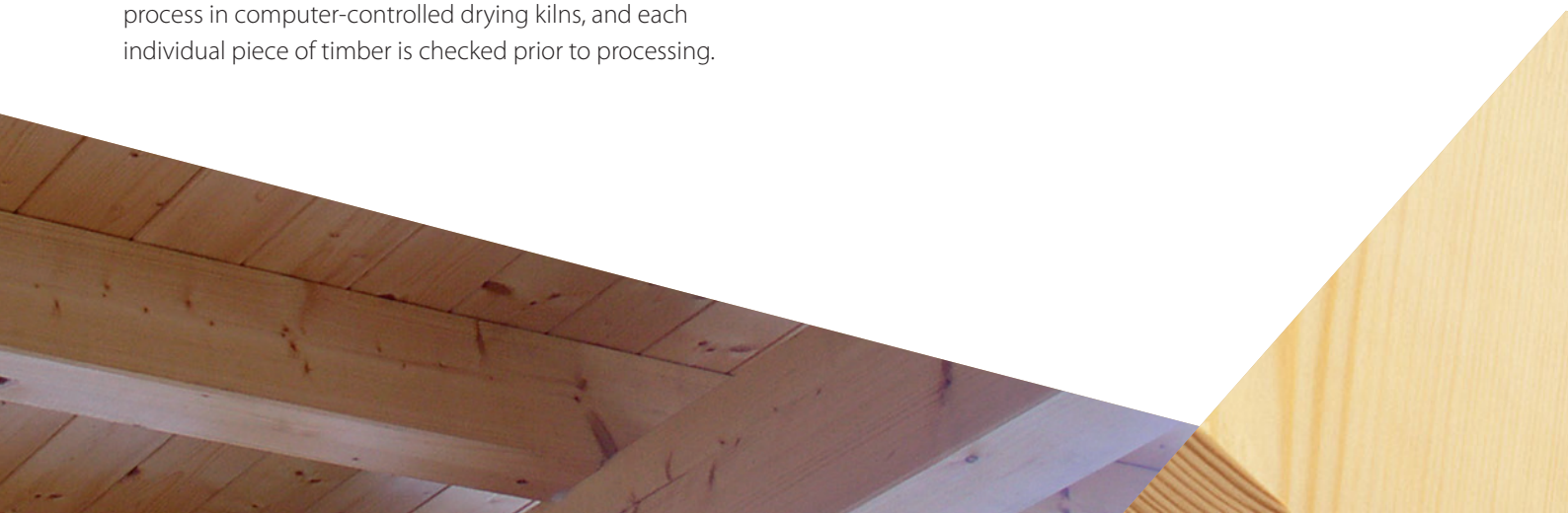
Duobalken® and Triobalken® laminated beams and glued laminated timber are planed and chamfered on four sides as standard. Beams used in visible areas are specially selected during evaluation of the raw materials and during production. If necessary, minor defects are reworked. Thus, two different surface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

No chemical wood preservation required

Due 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 unnecessary.
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).



Standard dimensions

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

The advantages of standardisation for trade and processors speak for themselves:

- **Production from raw materials in stock**
- **Short delivery times**
- **Economic planning and execution**

Order-related standard dimensions for Duobalken® and Triobalken® in NSi and Si

Standard length: 13.00 m (up to 16.00 m possible), type of wood: spruce

Height mm

NSi (non-visible)

NSi (non-visible) and Si (visible)

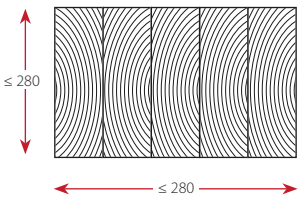
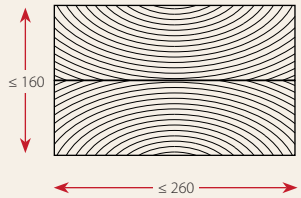
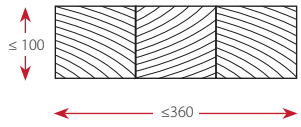
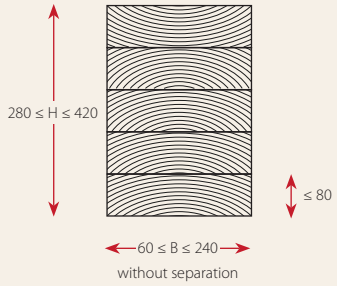
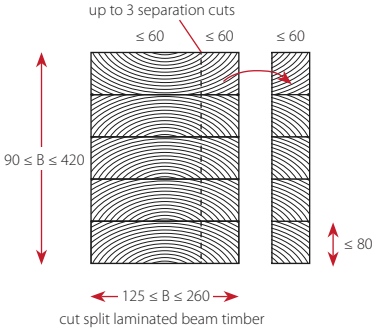
Width mm	80	100	120	140	160	180	200	220	240
60 Units/Pack	91	77	63	56	49	42	35	35	28
80 Units/Pack	65	55	45	40	35	30	25	25	20
100 Units/Pack		44	36[1]	32	28	24[1]	20	20[1]	16
120 Units/Pack			27	21[1]	21	18	15	15	12
140 Units/Pack				24	21	18[1]	15	15[1]	12
160 Units/Pack					14	10[1]	10	8[1]	8
180 Units/Pack						12	10	10[1]	8
200 Units/Pack							10		8
240 Units/Pack									4

1) Only possible as calculation dimension + 20mm in height.
Visible quality (Si): high-quality product for visually demanding areas such as visible ceiling beams, rafters and log house beams.

Production and application are subject to national regulations, which may differ from each other. Therefore, Duobalken®, Triobalken® and laminated beams are currently manufactured as shown below.

In order to standardise application and availability within this variety of dimensions, you will find a list of standard cross-sections on the following pages, which are either held in stock or manufactured to order.

Definition of Duobalken®, Triobalken® laminated beams and glued laminated timber

Laminated beams made of two to five lamellas bonded together according to DIN EN 14080:2013	W ≤ 280 mm 90 < H ≤ 280 mm 45 < t ≤ 85 mm lamella thickness	
Laminated beam timber made of two lamellas glued together and with universal finger joint according to Z 9.1-440[1,2]	W ≤ 260 mm H ≤ 160 mm 20 ≤ t ≤ 80 mm lamella thickness	
Laminated beam timber made of three lamellas glued together with gluing of the narrow sides according to Z 9.1-440[1,3]	60 ≤ W ≤ 100 mm 60 < H ≤ 360 mm 20 < t ≤ 120 mm lamella thickness W ≤ 100 mm lamella width	
Homogenous laminated beam timber without split cut[1] and combined laminated beam timber[4] of greater total height according to Z 9.1-440 made of up to nine lamellas	60 ≤ W ≤ 240 mm 280 < H ≤ 420 mm 4 5 < t ≤ 80 mm lamella thickness	
Homogenous, split laminated beam timber according to Z 9.1-440[3,5] consisting of up to nine lamellas	60 ≤ W ≤ 120 mm 90 < H ≤ 420 mm 45 < t ≤ 80 mm lamella thickness	

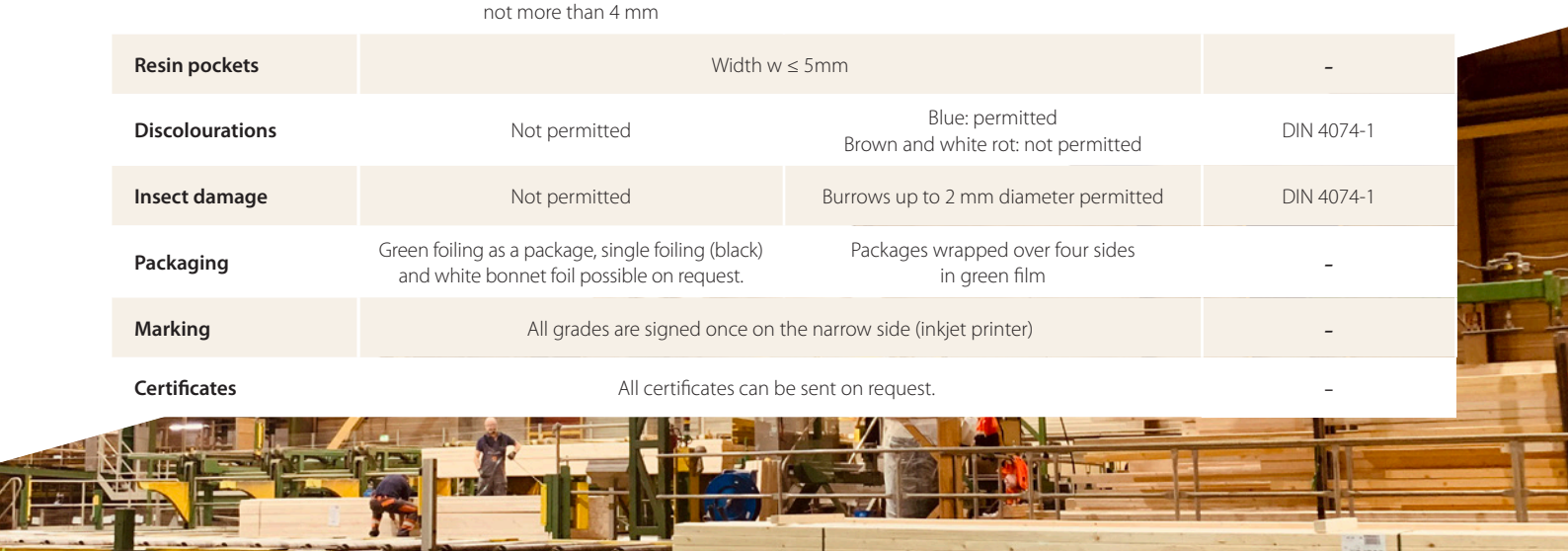
1) Made of lamellas of at least strength class C24.
2) Universal finger joints are only permitted in laminated beams made of two lamellas glued together.
3) The individual timbers must be core-separated.
4) Made of lamellas of strength classes C24 (outer lamellas) and C18 (inner lamellas).
5) Dimensions after splitting.

Quality Criteria

Duobalken®, Triobalken® and glued laminated timber

Requirements for Duobalken® and Triobalken® beams according to the general building approval of the German Institute for Building Technology Z-9.1-440 and the agreement on Duobalken® and Triobalken® beams.

Grading criterion	Requirement to be met by Duobalken®, Triobalken® laminated beams and glued laminated timber		Remarks
	visible areas (Si)	non-visible areas (NSi)	
Technical standard	DIN EN 14080:2013 or according to building authority approval Z 9.1-440		-
Strength class according to DIN EN 338	C24 (C24M)		-
Wood moisture content	max. 15%		-
Dimensional stability of the cross-section	DIN EN 336 Dimensional tolerance class2 b≤100mm= ± 1.0mm b>100 and ≤300= ±1.5mm		-
Twisting	≤4 mm/2 m		For comparison: DIN 4074-1;S10: ≤8 mm/2 m
Longitudinal curvature	≤4 mm/2 m		For comparison: DIN 4074-1;S10: ≤8 mm/2 m
Surface finish	Planed and chamfered on 4 sides	Levelled and chamfered	The right side must face outwards
Machining of the ends	Hacked/Cut at right angles		-
Gluing	DIN EN 14080:2013 or according to building authority approval Z 9.1-440		-
Incision type	two handled incision	two handled incision	-
Tree edge	Not permitted		-
Knot condition	Loose branches and fallen branches are not permitted; isolated knots or parts of knots up to 20 mm Ø are permitted.	according to DIN 4074-1	-
Knot diameter ratio	S10: A≤ 2/5 not exceeding 70 mm	For machine sorting, the following applies: for NSi, the largest branches are not taken into account and for Si, A ≤ 2/5 applies.	-
Ingrown bark	Not permitted	-	Bark will be added to the knot
Cracks (dry cracks)	Crack width w ≤2% of the respective cross-sectional side of the individual timbers, not more than 4 mm	according to DIN 4074-1	-
Resin pockets	Width w ≤ 5mm		-
Discolourations	Not permitted	Blue: permitted Brown and white rot: not permitted	DIN 4074-1
Insect damage	Not permitted	Burrows up to 2 mm diameter permitted	DIN 4074-1
Packaging	Green foiling as a package, single foiling (black) and white bonnet foil possible on request.	Packages wrapped over four sides in green film	-
Marking	All grades are signed once on the narrow side (inkjet printer)		-
Certificates	All certificates can be sent on request.		-



Range
Duobalken®, Triobalken® and laminated beams

Standard:
Package of one cross-section and one quality in defined packaging unit.

System lengths:
Package in one system length (e.g. 7.00 m, 7.50 m, 8.00 m, 8.50 m or 9.00 m) with uniform dimension and quality (NSi, Si).

Individual Beams:
Preferred range of cross-sections that ensures piece-precise availability.

Duobalken®, Triobalken® and laminated beams as individual beams

The availability of Duobalken®, Triobalken® and laminated beams as individual beams as well as storage offer flexibility, quick availability as well as technical advantages.

Types of wood, strength values and calculated values of the structural-physical properties

Technical properties	KVH	Duobalken® and Triobalken®
Wood type	Spruce (pine, larch on request)	
Strength classes according to DIN EN 338, relevant values according to DIN EN 14080:2013 or general building authority approval Z9.1440	C24 oder C24M[1]	
Modulus of elasticity, mean value parallel to the grain	$E_{o,mean}$ 11.000 N/mm²	11.000 N/mm²
Wood moisture content at	15% ± 3%	≤ 15%
Calculated value of swelling and shrinkage	0,24% per 1% wood moisture change	
Building material class according to DIN EN 13501-1	D-s2, d0	
Calculated values of thermal conductivity λ according to DIN 4108-4	0,13 W/(mK)	
Water vapour diffusion resistance μ according to DIN 4108-4	40	

1) M = machine sorted.

2) DIN 18334 "VOB, part C (ATV), Zimmer- und Holzbauarbeiten" (carpentry and timber construction work) prescribes a maximum wood moisture content of 18% for timber houses. Duobalken®, Triobalken® and laminated beams easily meet this requirement.

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