

binderholz

tiptop timber



English

BINDERHOLZ CLT BBS



binderholz **NATURE IN ARCHITECTURE**

WOOD - AN INTELLIGENT RAW MATERIAL

Wood is a fascinating, versatile and intelligent material that plays an important role for us humans in many different ways. In addition to its important role as a provider of well-being, protection and wood as a natural raw material the young tree in the forest fulfils another valuable function: it extracts harmful CO₂ from the air, binds carbon C and releases oxygen O₂ into the atmosphere. Wood has a broad and fascinating range of uses. Whether as a simple wooden spoon, a musical instrument, object of art, furniture, heat and energy provider or as a hightech product for solid wood structures, we come into contact with this unique raw material every day. The characteristics of this intelligent material are reflected in its loadbearing capacity, durability, stability and fire resistance, to name but a few. Wood also has a positive influence on the well-being of humans and therefore on their health.

BENEFITS OF SOLID BINDERHOLZ CLT BBS CONSTRUCTION

uncomplicated | fast | dry

The solid BBS construction method combines all of the advantages of solid structures such as sound insulation, fire protection, solid construction, value retention, etc., with the ecological benefits of wood as a sustainable raw material.

solid construction • dimensional stability • living space comfort
short construction times • visible quality • space gain
prefabrication • low thermal conductivity



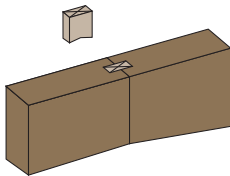


BINDERHOLZ CLT BBS

BBS is multilayered, completely solidly made of wood. Thanks to the gluing of longitudinal and transverse layers, the working behaviour of the wood is reduced to a negligible degree. Thus, meeting standards of a modern building material are assured. BBS is a solid prefabricated element made of wood that insulates heat and can simultaneously carry heavy loads. It has a building fire resistance and has a good sound absorbing effect. It can be constructed fast, dry and has a positive effect on the well-being of humans. BBS is made from 99,4 % timber and 0,6 % glue - that is BBS, a monolithic building material.

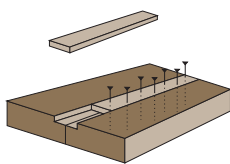
Combining the BBS 125 system format with the large-format panel BBS XL enables builders and designers to work even more flexibly with BBS cross-laminated timber and therefore making targeted use of each individual format.

BINDERHOLZ CLT BBS | AT ONE SIGHT



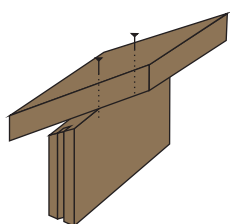
BBS WALLS

BBS wall elements solidly and definitely fulfil all static, reinforcement, fire prevention, and building physics requirements. With BBS, low-energy, passive-energy and plus-energy buildings can be produced. BBS constructions fulfil all of the standard heat insulation values in accordance with the best available technology and provide a comfortable and balanced living climate thanks to vapour permeability and the ability to reduce peak room air humidity values.



BBS CEILINGS

Building the ceilings with BBS does not only have constructive advantages such as self-supporting and dry construction methods, slab effect, dimensionally stable components, adequate fire rating and sound-proofing, but also provides finished visible surfaces, as well as a fair dose of living comfort due to the positive effect the bulk of wood has on the air condition in the room.



BBS ROOF

BBS can be used for every kind of roof. Thus, rain impermeability and finished visible surfaces on the inside are quickly possible. BBS roof constructions securely and solidly fulfil all static, fire prevention and sound technical requirements. As BBS insulates with excellent heat storage properties, it not only contributes in winter to a comfortable warm room temperature but also to effective protection from the building overheating in the summer (summer heat protection).



BINDERHOLZ BAUSYSTEME | COMPETENCE

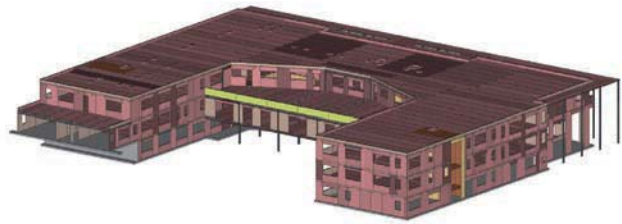
binderholz not only produces all solid wood products required for wood construction - it offers, in addition, comprehensive engineering services with the product solutions:

Assistance and consulting by qualified contact persons

Engineering | building physics

Product combinations of different wood construction products

Logistics planning and solutions



BINDERHOLZ BAUSYSTEME | SERVICE

Cost estimate

Concept statics, building physics, fire protection, detailed solutions

Structural pre-analysis measurement schedule BBS statics program

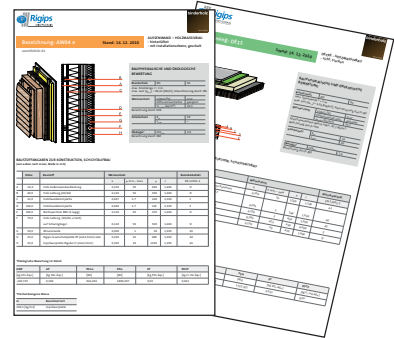
Technical consultancy

Find the **BBS statics program** and the **Processing Guidelines for binderholz CLT BBS** on our website www.binderholz.com



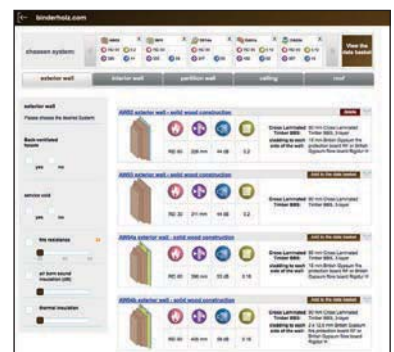
SOLID WOOD CONSTRUCTION MANUAL

The solid wood construction manual developed by binderholz and Saint Gobain Rigips Austria offers 133 certified construction designs for walls, ceilings and roofs and provides comprehensive information on the subjects of fire protection, heat and sound insulation and ecological evaluation.



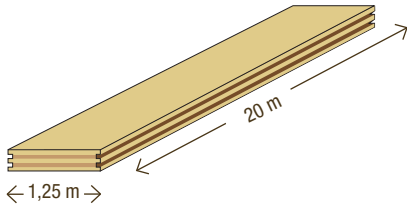
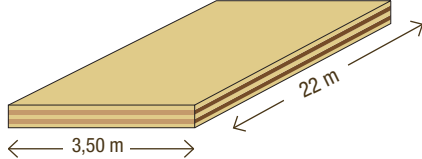
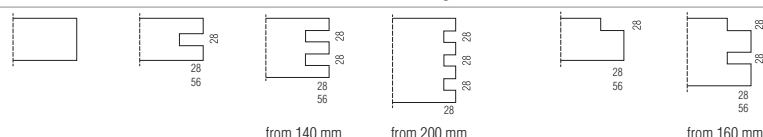
ONLINE DATABASE

The constructions of the solid wood construction manual are now available with 1.200 detailed drawn details on www.binderholz.com





BINDERHOLZ CLT BBS | TECHNICAL DATA

	BBS 125	BBS XL
		
Construction	cross laminated timber 3-, 5-, 7-ply	cross laminated timber 3-, 5-ply
Format	system format	large format
Width Length	1,25 m up to 20 m	maximum 3,50 m up to 22 m
Thickness	60 up to 340 mm	60 up to 200 mm
Moisture content	12 % +/- 2 % at point of delivery	
Weight	470 kg/m ³ (spruce at 12 % moisture content)	
Lamellas	thickness 20, 30, 35 or 40 mm softwood content, kiln dried, quality graded	
Quality top layer	classification to DIN EN 13017-1	
	AB - one side residential visible quality BC - one side industrial visible quality NH-C - non-visible	AB - one side residential visible quality BC - one side industrial visible quality NH-C - non-visible
Top layer	visible top layer lengthwise (DL) single ply board 1,25 m width polished or brushed; wood species: spruce, larch, antique (steamed fir, rustical brushed)	top layer crosswise (DQ) single ply board 1,25 m width, polished vertical chamfer at butt joints, wood species: spruce
	non-visible top layer lengthwise (DL)	top layer lengthwise (DL) top layers crosswise (DQ) gaps between the lamellas are allowed
Finger joint	general finger joint	lamellas individually finger jointed top layer of visible AB/BC quality without fingerjoints
Calculation widths	0,625 1,25 m	2,40 2,60 2,75 2,95 3,20 3,50 m
Machining	CNC machining	
Longitudinal edges		
Gluing	BBS: formaldehyde-free PUR adhesive EN 15425 + EN 14080:2013 single ply board: MUF EN 301; emission class E1	
Dimensional change	longitudinal: 0,010 % per % of change in moisture content perpendicular: 0,025 % per % of change in moisture content	
Heat insulation	heat conductance in accordance to EN ISO 10456: $\lambda_R = 0,12$ W/mK specific thermal capacity $c = 1600$ J/kgK conductibility of temperature $a = 1,806 \times 10^{-7}$ m ² /s U-values for build ups: please see binderholz Rigips „Handbuch Massivholzbau“	
Sound insulation	high sound protection due to solid construction certificate available on request please see binderholz Rigips „solid timber manual“	
Fire protection	in accordance to EN 13501: D, s2, d0 report for REI 30 - 90 and classification reports on request fire rates: depending on type and usage of the panel: 0,67 - 0,74 mm/min	
Diffusion resistance	open to vapour diffusion diffusion resistance coefficient $\mu = 40 - 70$ (depending on the moisture content of the wood and number of layers)	
Air tightness	airtight from 3 layers, certificate on request	
Service classes	permitted for service class 1 or 2 in accordance to EN 1995-1-1	
Treatments	treatment class 2: protection against fungi and insect attack in accordance to DIN 68800, CTB P+ certificat, France	
Approvals	European Technical Approval ETA-06/0009 CE marking German Technical Approval Z-9.1-534 CSTB Avis Technique 3.3/14-784_V1	

BINDERHOLZ CLT BBS | CHARACTERISTIC VALUES

Cross section values for flexible connected longitudinal layers based on the the Gamma-method

Layers	Quality top layer		Thickness [mm]	Construction [mm]							Characteristic values					
	BBS 125	BBS XL		S1	S2	S3	S4	S5	S6	S7	L_{eff} (m)	A_{eff} (cm ²)	W_{eff} (cm ³)	I_{eff} (cm ⁴)	i_{eff} (cm)	
3	AB, BC, NH-C	DQ-AB/BC, NH-C	60	20	20	20					2	400	562	1577	1,99	
											4		574	1691	2,06	
											6		576	1714	2,07	
	AB, BC, NH-C	DQ-AB/BC, NH-C	80	20	40	20						2	400	892	3091	2,78
												4		923	3548	2,98
												6		929	3649	3,02
	NH-C	NH-C	90	30	30	30						2	600	1225	4790	2,83
												4		1280	5539	3,04
												6		1291	5707	3,08
	NH-C	NH-C	100	35	30	35						2	700	1512	6469	3,04
												4		1592	7617	3,30
												6		1608	7881	3,36
NH-C	NH-C	120	40	40	40						2	800	2086	9991	3,53	
											4		2249	12613	3,97	
											6		2283	13277	4,07	
5	AB, BC, NH-C	DQ-AB/BC, NH-C	100	20	20	20	20	20				600	2	1273	5458	3,02
													4	1308	6270	3,23
													6	1315	6449	3,28
	AB, BC, NH-C	DQ-AB/BC, NH-C	120	20	30	20	30	20				600	2	1623	7743	3,59
													4	1680	9447	3,97
													6	1691	9851	4,05
	AB, BC, NH-C	NH-C	140	40	20	20	40	40				1000	2	2748	15078	3,88
													4	2945	19175	4,38
													6	2986	20213	4,50
	---	DQ-AB/BC, NH-C	140	20	40	20	40	20				600	2	1976	10240	4,13
													4	2057	13190	4,69
													6	2073	13937	4,82
	AB, BC, NH-C	---	150	40	20	30	20	40				1100	2	3113	18164	4,06
													4	3321	23122	4,58
													6	3364	24378	4,71
	AB, BC, NH-C	NH-C	160	40	20	40	20	40				1200	2	3506	21680	4,25
													4	3721	27580	4,79
													6	3764	29074	4,92
	AB, BC, NH-C	NH-C	180	40	30	40	30	40				1200	2	4061	25338	4,60
													4	4403	35310	5,42
													6	4474	38154	5,64
	AB, BC, NH-C	NH-C	200	40	40	40	40	40				1200	2	4617	29001	4,92
													4	5094	43666	6,03
													6	5195	48294	6,34
AB, BC, NH-C	---	220	60	30	40	30	60				1600	2	6099	42978	5,18	
												4	6984	65856	6,42	
												6	7186	73412	6,77	
AB, BC, NH-C	---	240	60	40	40	40	60				1600	2	6708	46343	5,38	
												4	7912	77453	6,96	
												6	8198	89042	7,46	
AB, BC, NH-C	---	300	80	30	80	30	80				2400	2	11037	96872	6,35	
												4	12916	158836	8,14	
												6	13368	181919	8,71	
AB, BC, NH-C	---	320	80	40	80	40	80				2400	2	11567	96978	6,36	
												4	14025	173440	8,50	
												6	14648	205926	9,26	
7	AB, BC, NH-C	---	260	60	20	40	20	40	20	60	2000	2	8396	66601	5,77	
												4	9626	105298	7,26	
												6	9905	118503	7,70	
	AB, BC, NH-C	---	280	60	40	20	40	20	40	60	1600	2	7925	52997	5,76	
												4	9926	102510	8,00	
												6	10439	125183	8,85	
AB, BC, NH-C	---	340	80	40	30	40	30	40	80	2200	2	11089	84044	6,18		
											4	14803	174521	8,91		
											6	15870	222383	10,05		

L_{eff} ... Length

I_{eff} ... Torque of inertia

A_{eff} ... Cross section area (only longitudinal layers)

i_{eff} ... Radius of inertia

W_{eff} ... Section modulus

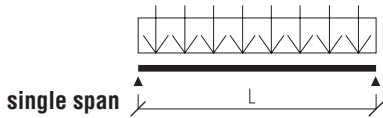
Quality of the top layer according to DIN EN 13017-1:

AB ... Residential visible quality NH-C ... Non-visible

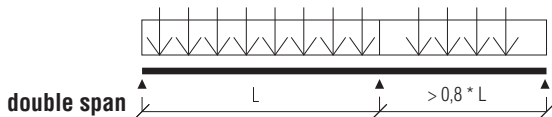
BC ... Industrial visible quality DQ ... Toplayer crosswise

Kind of loading [N/mm ²]	ETA 06/0009 EN 338		
	BBS 125	BBS XL	
E-modulus bending	$E_{0,mean}$	12.000	12.000
Bending normal to plane	$f_{m,k}$	18,0	24,0
Modulus of shear	G_{mean}	690,0	690,0
Modulus of rolling shear	$G_{r,mean}$	50,0	50,0
Shear from lateral force	$f_{R,k}$	1,0	1,0
Pressure in plan	$f_{c,0,k}$	21,0	21,0
Pressure normal to plane	$f_{c,90,k}$	2,5	2,5
Tension in plane	$f_{t,0,k}$	9,8	14,0

BINDERHOLZ CLT BBS | LOAD TABLES



Loads (kN/m)		Span width													
		3,0 m		3,5 m		4,0 m		4,5 m		5,0 m		5,5 m		6,0 m	
g1, k	nk	Permitted deflection													
		I/250	I/350	I/250	I/350	I/250	I/350	I/250	I/350	I/250	I/350	I/250	I/350	I/250	I/350
1,0	1,0	80	80	90	90	100-5s	120-5s	120-5s	140	140	140	140	150	160	180
1,0	1,5	80	90	90	100-5s	100-5s	120-5s	120-5s	140	140	140	140	160	160	180
1,0	2,0	80	90	90	120-5s	120-5s	140	140	140	140	150	140	160	180	180
2,0	1,5	90	100-5s	120-5s	120-5s	140	140	140	150	150	160	160	200	180	220
2,0	2,0	90	100-5s	120-5s	140	140	140	140	150	150	180	160	200	180	220
2,5	2,0	90	120-5s	120-5s	140	140	140	140	160	150	180	180	200	200	220
2,5	2,5	90	120-5s	120-5s	140	140	140	140	160	160	180	180	220	200	220
2,5	3,0	90	120-5s	120-5s	140	140	140	140	160	160	200	180	220	200	220
2,5	3,5	100-5s	120-5s	120-5s	140	140	140	140	160	160	200	180	220	220	220
2,5	4,0	100-5s	120-5s	120-5s	140	140	150	150	180	160	200	200	220	220	220
2,5	4,5	120-5s	120-5s	140	140	140	150	150	180	180	200	200	220	220	240
2,5	5,0	120-5s	140	140	140	140	150	150	180	180	200	200	220	220	240
2,5	5,5	120-5s	140	140	140	140	160	160	180	180	200	200	220	220	240



The length of the shorter length is between 80 % and 100 % of the longer field.

Loads (kN/m)		Span width													
		3,0 m		3,5 m		4,0 m		4,5 m		5,0 m		5,5 m		6,0 m	
g1, k	nk	Permitted deflection													
		I/250	I/350	I/250	I/350	I/250	I/350	I/250	I/350	I/250	I/350	I/250	I/350	I/250	I/350
1,0	1,0	80	80	80	80	80	90	90	100-5s	100-5s	120-5s	120-5s	140	140	140
1,0	1,5	80	80	80	80	80	90	90	120-5s	120-5s	120-5s	120-5s	140	140	140
1,0	2,0	80	80	80	90	90	100-5s	100-5s	120-5s	120-5s	140	140	140	140	140
2,0	1,5	80	80	80	90	90	120-5s	120-5s	140	140	140	140	140	150	160
2,0	2,0	80	80	90	90	90	120-5s	120-5s	140	140	140	140	150	150	160
2,5	2,0	80	90	90	100-5s	100-5s	120-5s	120-5s	140	140	140	140	150	160	180
2,5	2,5	80	90	90	100-5s	120-5s	120-5s	120-5s	140	140	140	140	160	160	180
2,5	3,0	80	90	90	120-5s	120-5s	140	140	140	140	140	140	160	160	180
2,5	3,5	80	90	90	120-5s	120-5s	140	140	140	140	150	140	160	160	180
2,5	4,0	90	90	100-5s	120-5s	120-5s	140	140	140	140	150	150	180	180	200
2,5	4,5	90	100	100-5s	120-5s	120-5s	140	140	140	140	160	150	180	180	200
2,5	5,0	90	100	120-5s	140	140	140	140	150	140	160	160	180	180	220
2,5	5,5	90	120	120-5s	140	140	140	140	150	150	180	160	200	180	220

R30	3s ... 3 layers
R60	5s ... 5 layers
R90	

Dimensioning according to Eurocode 5 and European Technical Approval (EN 1995-1-1:2004 und ETA 6/0009:2006)

Requirements:

Service Class 1 (Interior space $k_{def} = 0,6$)

dead load g_w : dead load without material weight of BBS (already included in the calculation)

live load n_k : Categories A and B (Living- and office space $\psi_0 = 0,7$ $\psi_1 = 0,5$ $\psi_2 = 0,3$ middle load duration, $k_{mod} = 0,8$)

Dimensioning in the case of fire according to EN 1995-1-2 and Survey IBS-080 12901:2008-06 (characteristic combustion rate for ceilings $\beta_n = 0,74$ mm/min)

Limiting values for deflection for serviceability limit states:

Appearance: permitted long-term deflection with a quasi-permanent design situation I / 250 respectively I / 350

Cross section values:

Calculation of BBS cross sections according to the Gamma-method. For continuous beam $I_{eff} = 4/5 * I$

These tables may be used for predimensioning of BBS and do not replace static calculations.

The characteristic loads are uniform loads.

BINDERHOLZ CLT BBS | GENERAL INFORMATION

Packaging | Transport

BBS 125

BBS 125 elements are delivered in plastic-wrapped packages. The size of the package depends on the delivery sequence and the maximum permissible weight per package. Visible-quality ceiling elements are delivered face down with the exception of the bottom-most panel to ensure the visible surface is protected from dirt and damage. BBS wall elements and BBS standard elements are packaged face up. BBS 125 elements are always laid flat for transportation.



BBS XL

BBS XL elements can be transported either laid flat or upright depending on requirements. Country-specific regulations applicable to transporting elements wider than 2,5 or 3 m and higher than 2,95 m need to be clarified with the shipping department. All transports are protected from the elements.



Assembly | Loading

Assembly loops can be incorporated on request. It is also possible to fit bolts ready for assembly using the Assy lifting system by Würth for thicknesses as of 100 mm or else a sling lifting system with stud hole and steel dowel pin. Lifting loops can be incorporated in wall elements.



CNC processing

BBS is processed using automatic profiling and CNC-controlled joinery machines. These machines are equipped with tools for processing base construction materials. For more detailed information please ask for the CNC joinery machine data sheet.



Process flow

The quality and degree of detail of our bidding and order processing processes depend heavily on the documents provided. CAD Drawings in 3D or 2D format are ideal. Work plans need to be converted into single part drawings to enable smooth project progress. Order confirmation and production release are issued after the customer has placed an order. The customer receives the completed project plans in the form of single part drawings, overview drawings, parts lists and a delivery sequence with package lists. These documents clearly define all of the dimensions, surface finishes and processing methods. The details are provided to the customer for verification and are followed by a binding design and production release.

BINDERHOLZ CLT BBS | SURFACES

Non-visible quality C

Non-visible quality is used mainly for construction elements that will be covered with, for example, plasterboard at a later stage. Lamellas are sorted by quality and dried by technical means. BBS elements do not meet specific visual requirements. Discolouration and different wood types are permissible.



Visible industrial quality BC

This quality is intended for use in commercial and industrial buildings. It is provided as standard in spruce with visible industrial quality on one side and a top layer consisting of a mix of B and C lamellas in accordance with DIN EN 13017-1.



Visible residential quality AB

Visible residential quality is used for residential buildings, schools and offices, among others. The top layer is made of spruce, larch, swiss pine or antique and polished on one face. It corresponds to a mix of A and B lamellas in accordance with DIN EN 13017-1.



Special processing

Brushed surface

Dip impregnation

Impregnation against wood-destroying fungi and insects



BINDERHOLZ CLT BBS | TOP LAYER SORTING

Extract from the European standard DIN EN 13017-1 surface classification of BBS			
Grade	A	B	C
Adhesion	no open glued joints	open joints < 100 mm/m glued joint permitted	open joints < 100 mm/m glued joint permitted
Visual appearance and colour	well balanced in colour and texture	considerably balanced in colour and texture	no requirements
Texture	rough texture permitted	rough texture permitted	no requirements
Knots	healthy, strongly grown spruce knots: up to 40 mm Ø larch knots: up to 60 mm Ø and sporadic black knots	healthy, strongly grown knots and sporadic black knots permitted	permitted
Dowel ²	natural branch dowel permitted	permitted	permitted
Resin pocket	sporadic up to 3 mm x 40 mm permitted	sporadic up to 5 mm x 50 mm permitted	permitted
Repaired resin pocket	permitted	permitted	permitted
Ingrowing bark	not permitted	permitted if sporadic	permitted
Shake	sporadic surface shakes permitted	surface and end-shakes up to 50 mm length, permitted if sporadic	permitted
Pith	sporadic up to 400 mm length permitted	permitted	permitted
Compression wood	permitted if sporadic	permitted	permitted
Insect attack	not permitted	not permitted	small sporadic holes from non-active larvae permitted
Discolouring	not permitted	slight discolouring permitted	permitted
Decay	not permitted	not permitted	not permitted
Sapwood	with larch, narrow stripes up to 20 % of the laminated width permitted	permitted	permitted
Quality of the surface finish	small sporadic flaws permitted	sporadic flaws permitted	no requirements

² Measurements of oval dowels as by knots

The change in moisture content and the effect it has on the visual appearance takes place over three stages:

Production: Cross-laminating the dried kiln-lamellas (wood moisture content 12 % +/- 2 %) reduces the natural swelling and shrinking of BBS to a minimum.

Shell construction and assembly: BBS is subject to the natural seasonal climate changes during the shell construction and assembly period. Changes in the moisture content on account of prevailing climatic conditions are therefore possible.

Building use: The mean moisture content of BBS stabilises at around 8-10 % after a period of up to three heating seasons. These changes in moisture content can lead to visual signs such as cracks and gaps in BBS with quality facing. They do not have any influence on the static properties of BBS.

Even the greatest care during production and minimum changes in moisture content cannot completely rule out the appearance of cracks and gaps. Coatings applied to the visual quality surface can enhance their appearance.

Thicker BBS has a positive effect on the load-bearing capacity of external structures; however, it is also subject to greater swelling and shrinkage and therefore to greater crack and gap formation.

We have used the **tried and tested double-length layer** for our **BBS visible residential quality AB** for many years. It always consists of a 20 mm thick visible top layer glued to a second longitudinal layer with a thickness of at least 20 mm. In this way we can combine the top visible quality and high stability of the top layer with the strong load-bearing capacity of the element. The true quality of cross-laminated timber in visible quality does not become apparent until 1 to 3 heating seasons have passed.

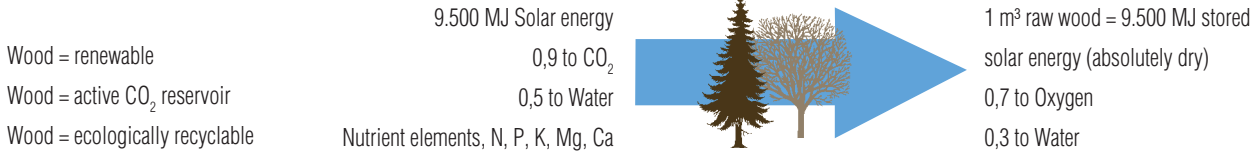
Use our experience to your advantage.



CONSTRUCTION WILL CHANGE - SUSTAINABLE CONSTRUCTION WILL BECOME STANDARD

Wood as renewable construction material

Eco-bonus wood



binderholz CLT BBS = active CO₂ reservoir

In each m³ of BBS, 676 kg of CO₂ are still „stored“ after the production process!

BBS annual output = 200.000 m³ = 135.000 tons of „stored“ CO₂

that's as much as: 90.000 plane trips from Munich to New York and back

77.500 cars emit each year

15.100 Europeans produce each year

During photosynthesis the tree extracts CO₂ from the air and converts it into carbon C and oxygen O₂. C remains stored in the tree whilst O₂ is released into the atmosphere. Around a billion „stockpile“ solid cubic metres of wood (1 solid cubic metre corresponds to about 1 m³) are in the forest, ready to use. Austria is, therefore, at the forefront of the European field - it's even leading, with respect to wood stockpile per ha of forest area, in comparison with the main EU producers and markets. Around 31 million solid cubic metres grow back each year. Of those, only two-thirds are currently harvested.

Wood and „Grey Energy“

„Grey Energy“ represents the cost of excavating, manufacturing and transporting construction and production materials. The construction industry currently consumes a large proportion of the world's available raw materials and energy resources due to the conventional construction methods and materials it uses. Additionally, these materials are usually combined with insulating materials that are derived from mineral oil and therefore contribute both during their production and disposal towards the CO₂ responsible for global warming. Wood also contains „Grey Energy“, albeit significantly less. The reason why is obvious: wood grows virtually of its own accord. The only „expenses“ are rain and solar energy, neither of which have an influence on the ecological balance sheet. The energy needed to maintain the forests and harvest the timber is negligibly low.

Positive energy balance sheet

Wood products contain more energy than is required for their manufacture. More than 50 % of the solar energy they store is carried forward during their life span and is available at the end of their life cycle to produce energy in the form of heat or electricity.



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