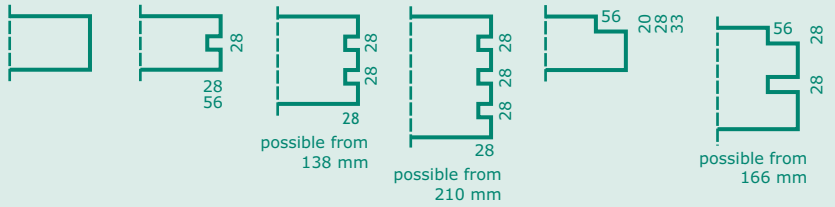
BBS tecnical data

design	multi-ply, crosswise | 3-, 5-, 7- and 9-layered
type of wood	spruce | larch | arolla pine | douglas | white fir
wood humidity	12 % +/- 2 %
quality top ply	residential visible AB industrial visible BC non visible
surfaces AB | BC	plane jointless glued | each longitudinal layer = single ply panel planed double-sided | optional polished on one side or brushed
dimensions	width | 125 cm length | up to 24 m [general finger joint GFJ] thickness | 65 mm - 282 mm
longitudinal edge	all longitudinal edges lightly chamfered [~ 3 mm] standard profile, double-sided 
adhesion	single ply panel: MUF | E1, watertight, transparent BBS: PU-glue | formaldehyde free
deformation	element length direction 0,010 % per % change of wood humidity elemental cross direction 0,025 % per % change of wood humidity
weight	spruce ρ[12%] ~ 470 kg/m3 larch ρ[12%] ~ 590 kg/m3
heat insulation	heat conductance λ_R = 0,13 W/mK [DIN] | $\lambda_{measured}$ = 0,092 W/mK [98 mm BBS] specific heat capacity c = 2,10 kJ/kgK heat penetration coefficient b = 22 kJ/m^{2}Kh$^{1/2}$
sound insulation	massive sound insulation through massive construction | expert's report on inquiry
fire protection	combustion speed 0,67 mm/min | expert's report on inquiry
diffusion	open to diffusion, vapour braking | diffusion resistance figure μ ~ 70
approval	European Technical Approval ETA-06/0009 | CE German Technical Approval DIBt-Berlin | Z-9.1-534

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BBS characteristics

cross sectional

layers	thickness[1)] [mm]	construction [mm]	A_{net} [cm2]	I_{net} [cm4]	W_{net} [cm3]	i_{net} [cm]	A_q [cm2]
3	65 / 19	19 27 19	380	2.125	654	2,36	650
	74 / 19	19 36 19	380	2.988	808	2,80	740
	81 / 19	19 43 19	380	3.766	930	3,15	810
	91 / 19	19 53 19	380	5.039	1.107	3,64	910
5	102 / 19	19 22 20 22 19	580	6.726	1.319	3,41	1.020
	112 / 19	19 27 20 27 19	580	8.398	1.500	3,81	1.120
	122 / 19	19 22 40 22 19	780	10.726	1.758	3,71	1.220
	130 / 19	19 36 20 36 19	580	11.886	1.829	4,53	1.300
	143 / 39	39 22 21 22 39	990	22.157	3.099	4,73	1.430
	153 / 39	39 27 21 27 39	990	26.408	3.452	5,16	1.530
	163 / 39	39 22 41 22 39	1.190	31.546	3.871	5,15	1.630
	171 / 39	39 36 21 36 39	990	35.043	4.099	5,95	1.710
	185 / 39	39 43 21 43 39	990	42.632	4.609	6,56	1.850
7	199 / 39	39 27 20 27 20 27 39	1.180	53.251	5.352	6,72	1.990
	226 / 39	39 36 20 36 20 36 39	1.180	72.448	6.411	7,84	2.260
	247 / 39	39 43 20 43 20 43 39	1.180	89.456	7.243	8,71	2.470
9	282 / 39	39 36 20 36 20 36 20 36 39	1.380	128.878	9.140	9,66	2.820

total / top layer[1)] double-sided visible quality | 2 mm thinner

... longitudinal layer
... cross layer

... standard thickness

A_{netto} ... cross sectional area net [only longitudinal layers]
I_{netto} ... torque of inertia net [only longitudinal layers]
W_{netto} ... section modulus net [only longitudinal layers]
i_{netto} ... gyration radius net [only longitudinal layers]
A_q ... total cross section area [for thrust calculation]
crosssectional data relating to BBS with a width of 1 m

material

kind of loading	DIN 1052-1 | DIN 4074-1 [N/mm2]		relating to
E-module inflexion	E_B	11.000	net cross section
inflexion right angled to plane	perm s_B	7,50	net cross section
G-module from lateral force	G_q	60	total cross section
thrust from lateral force	perm t_q	0,30	total cross section
pressure in palne	perm s_D	8,50	net cross section
normal pressure to plane	perm $s_{D\ normal}$	2,50	surface
pull on plane	perm s_Z	4,90	net cross section
kind of loading	**EN 1995-1-1 | EN 338 [N/mm2]**		**relating to**
E-module inflexion	$E_{o,mean}$	11.000	net cross section
inflexion right angled to plane	$f_{m,k}$	18	net cross section
G-module from lateral force	G_{mean}	60	total cross section
thrust from lateral force	$f_{R,k}$	0,70	total cross section
pressure in palne	$f_{c,o,k}$	21	net cross section
normal pressure to plane	$f_{c,90,k}$	2,5	surface
pull on plane	$f_{t,o,k}$	9,80	net cross section

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BBS grading

spruce residential **AB** | example

spruce industrial **BC** | example

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BBS grading

top layer

extract from the european standard DIN EN 13017-1 classification of the surfaces of cross laminated timber			
characteristics	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
branches	healthy, strongly grown spruce branches : up to 40 mm diameter larch branches: up to 60 mm diameter sporadic black branches	healthy, strongly grown branches and sporadic black branches permitted	permitted
dowel [2]	Natural branch dowel permitted	permitted	permitted
rosin gall	sporadic up to 3 mm x 40 mm permitted	sporadic up to 5 mm x 50 mm permitted	permitted
repaired rosin galls	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
quality of the surface finish	is permitted small sporadic flaws	sporadic flaws	no requirements

[2] Measurements of oval dowels as by branches

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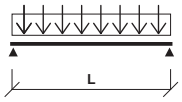
BBS predimensioning

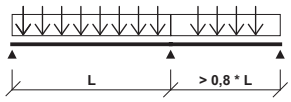
one field



area load in kN/m² excl. dead load BBS	span width													
	3,0 m		3,5 m		4,0 m		4,5 m		5,0 m		5,5 m		6,0 m	
	permitted bowing under load													
	l/300	l/400	l/300	l/400	l/300	l/400	l/300	l/400	l/300	l/400	l/300	l/400	l/300	l/400
2,0	74	81	102	102	102	122	122	143	143	143	143	153	153	163
2,5	81	102			112		130					163	163	185
3,0				112	122	143	143			153	153	171	171	199
3,5	102		112	122	130			153	153	163	163	185	185	226
4,0		112	122	130	143			163	163	185	171	199	199	
4,5				143							185			247
5,0			130			153	153	171	185	199	199	226	226	
5,5	112	122	143		143		163	185	199					282
6,0						163				226	226	247	247	
6,5														
7,0														
7,5	122	130			153									
8,0		143												

F60
F90

two fields



area load in kN/m² excl. dead load BBS	span width longer field													
	3,0 m		3,5 m		4,0 m		4,5 m		5,0 m		5,5 m		6,0 m	
	permitted bowing under load													
	l/300	l/400	l/300	l/400	l/300	l/400	l/300	l/400	l/300	l/400	l/300	l/400	l/300	l/400
2,0	65	65	74	74	81	102	102	102	102	122	122	143	143	143
2,5		74		81	102			112	112	130	130			153
3,0			81	102		112	112	122	122	143	143			163
3,5	74	81	102		112	122	122	130	143			153	153	171
4,0		102		112		130	130	143			153	163	163	185
4,5	81		112		122		143			153		171	171	199
5,0				122	130	143				171	163	185	185	
5,5	102		112		143				143				199	226
6,0				130				153		185	185	199		
6,5			143	143			143			199	199	226	226	247
7,0								163	143					
7,5										226	226	247	247	282
8,0														

F60
F90

The lenght of the shorter field amounts to between 80% and 100% of the longer field.

This tables may be used for predimensioning BBS and do not replace static calculations. The strain is to be seen as evenly divided area load. The dead load of BBS has been included in the calculation and does not have to be taken into consideration. Further predimensionings: office@binder-holzbausysteme.com

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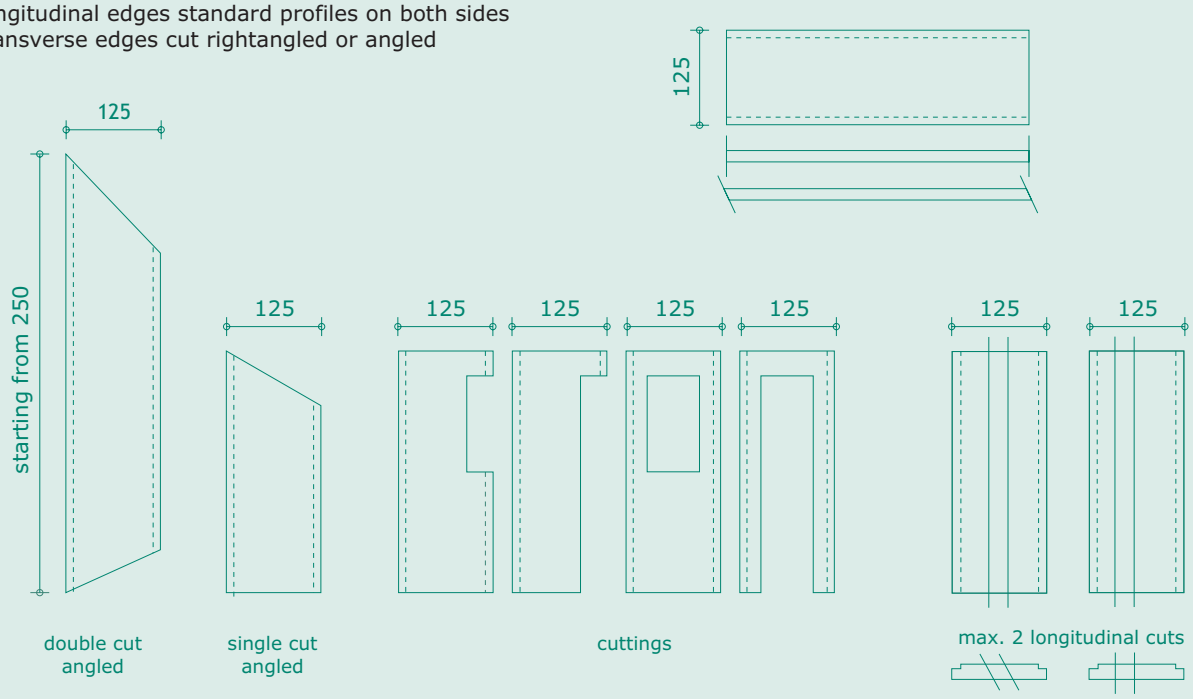
BBS charging

standard

longitudinal edges standard profiles on both sides
transverse edges cut rightangled | tolerance + 10 mm

CNC-machining

longitudinal edges standard profiles on both sides
transverse edges cut rightangled or angled



general

charging	charging width = 125 cm | 62,5 cm lengths are rounded up to full cm the circumlocutory rectangle sets the standardVerrechnungsbreite = 125 cm | 62,5 cm
not included	machining at transverse edges [notches, millcutting, flattering] cuttings < 25 cm round resp. curved machining drilling, slots, ...
tools	5-axial chain saw | max. cutting depth = 35 cm milling cutter | diameter 80 mm, 100 mm
special machining	on request | surcharge

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