prof. dr.-ing. h a r t m u t Werner
Publicly appointed and sworn-in expert

Load tables for a transport anchor system
with Würth *ASSY*® 4 Combi T
transport anchor self-tapping screws
d = 10 mm as defined under ETA-11/0190:2018
Threaded length lg = 145 mm

Transport anchor system with the ASSY 4 Combi T self-tapping screw and DEHA universal coupling, load group 1-1.3

General information

The load tables are nonbinding design aids. The load values must be reduced for shorter screw-in depths and threaded lengths.

The specifications in the European Technical Approval and in the expertise must be observed. The load bearing capacity of the transport system depends on many factors, e.g. hoist, fastening type, and properties of the transported element.

The DEHA universal coupling, load group 1–1.3, or the BGW ball head lifter can be used as the load bearing equipment. The operating instructions issued by the manufacturers must be observed. When subjected to inclined loads, the wood can be provided with a cutout that serves to reroute the horizontal components of the force directly into the wood. The screws can be driven into both undrilled and drilled wood components. In the latter case, the diameter of the drilled hole must correspond to the specifications in the ETA.

The wood components must be at least 40 mm thick.

The minimum distances of the screws, specifically from the edges of the wood, must be observed.

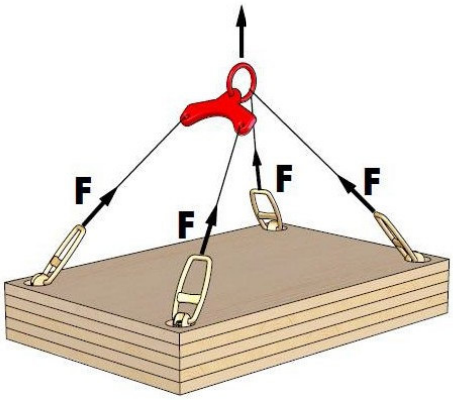
These loads, however, can swing when suspended from a crane. It is recommended to multiply the forces acting on the transport anchor system by the specified dynamic coefficients φ .

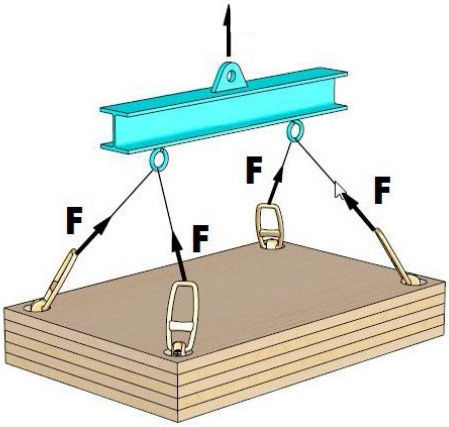
Recommended coefficients φ

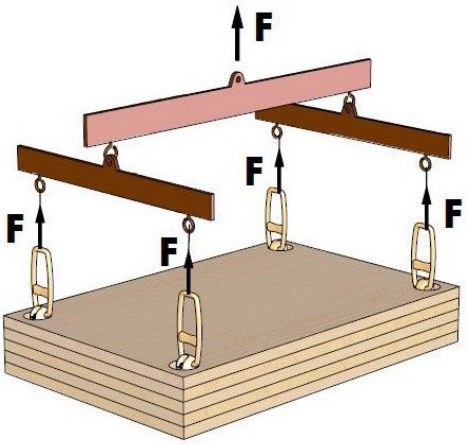
Lifting device	Lifting speed	Dynamic coefficient φ
Stationary crane, rotary crane Rail crane	< 90 m/min	1.10
Stationary crane, rotary crane Rail crane	≥ 90 m/min	1.30
Lifting and transporting on level ground		1.65
Lifting and transporting on		2.00

The number of anchors n defines the suspension gear used. Suspension gear consisting of more than three lines is always statically undefined when suitable measures do not distribute the load uniformly over all three.

The whole component should be secured with at least two self-tapping screws. However, it must be ensured that the screws are not driven into shrinkage cracks or similar.

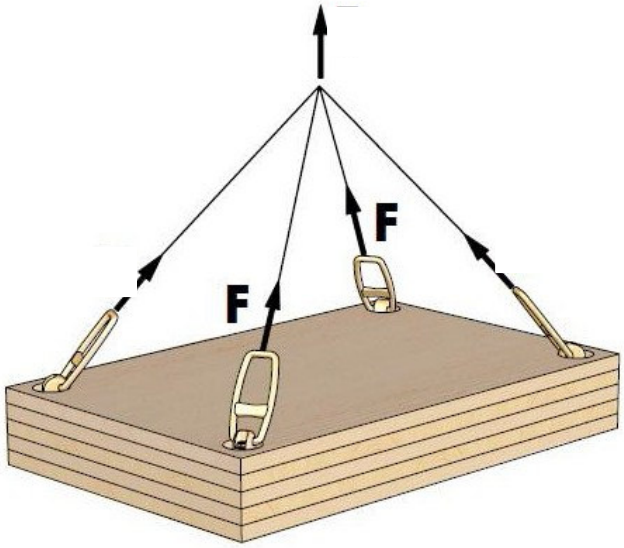






Spreader beam (n = 4)

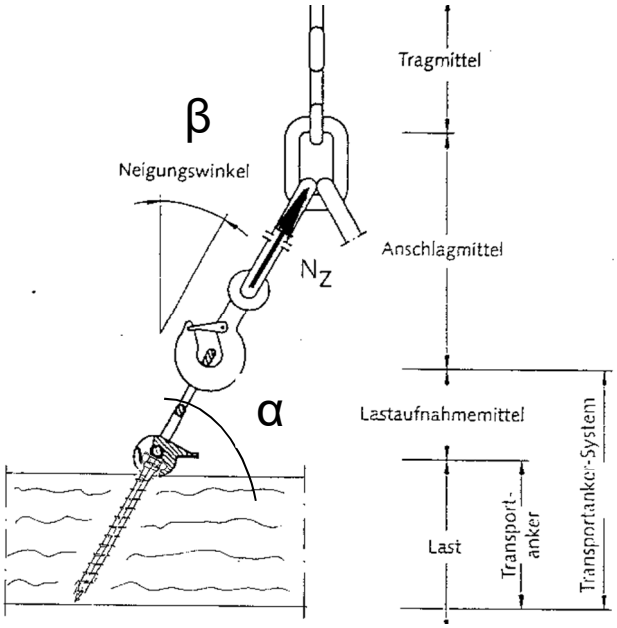
In the case of statically undefined suspension gear, BGR 500 (Section 2.8) stipulates that the anchors' dimensions must allow two of them to carry the entire load. The loads at the anchor sites must be calculated from the triangle of forces. For safety reasons, the screws may only be used **once**.



Statically undefined suspension gear (n = 2)

Fastening variant 1

Axial loading on the screw



Transport anchor under axial tensile load

Fastening variant "axial loading on screw"

Würth *ASSY*® 4 Combi T d = 10 mm, threaded length 145 mm

Attached to **solid structural timber, glued laminated timber or to the side of cross-laminated timber** and the face
(angle between screw axis and direction of grain ≥ 45°)

α	$F_{ax,Rk}$	N_z	**Load per attachment point**				
°	in kN	in	**kg**				
			φ = 1.0	φ = 1.10	φ = 1.30	φ = 1.65	φ = 2.00
90	14.5	7.44	744	676	572	451	372
85	14.5	7.44	741	673	570	449	370
80	14.5	7.44	732	666	563	444	366
75	14.5	7.44	718	653	553	435	359
70	14.5	7.44	699	635	537	423	349
65	14.5	7.44	674	613	518	408	337
60	14.5	7.44	644	585	495	390	322
55	14.5	7.44	609	554	469	369	305
50	14.5	7.44	570	518	438	345	285
45	14.5	7.44	526	478	404	319	263
40	13.4	6.86	441	401	339	267	220
35	12.2	6.28	360	327	277	218	180
30	11.1	5.70	285	259	219	173	143

Assumptions: **Characteristic density ρ_k =350 kg/m³**
The thread is anchored completely in the wood, without gaps in the component

Fastening variant "axial loading on screw"

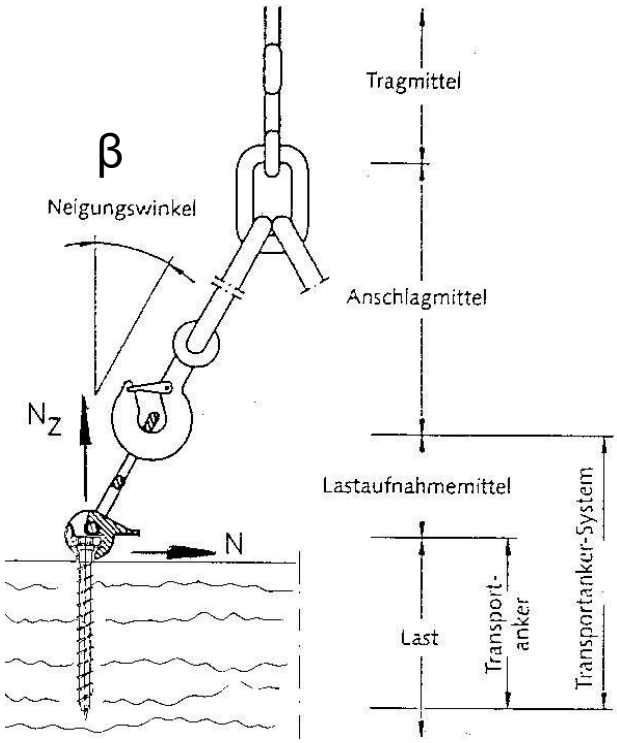
Würth *ASSY*® 4 Combi T d = 10 mm, threaded length 145 mm

Attached to **the face of cross-laminated timber**

α = β	$F_{ax,Rk}$	N_z	**Load per attachment point**				
°	in kN	in	**kg**				
			φ = 1.0	φ = 1.10	φ = 1.30	φ = 1.65	φ = 2.00
0	4.4	2.23	223	203	172	135	112
5	5.5	2.81	280	254	215	170	140
10	6.6	3.39	334	303	257	202	167
15	7.7	3.97	383	348	295	232	192
20	8.9	4.54	427	388	328	259	214
25	10.0	5.12	464	422	357	281	232
30	11.1	5.70	494	449	380	299	247
35	12.2	6.28	514	468	396	312	257
40	13.4	6.86	525	478	404	318	263
45	14.5	7.44	526	478	404	319	263

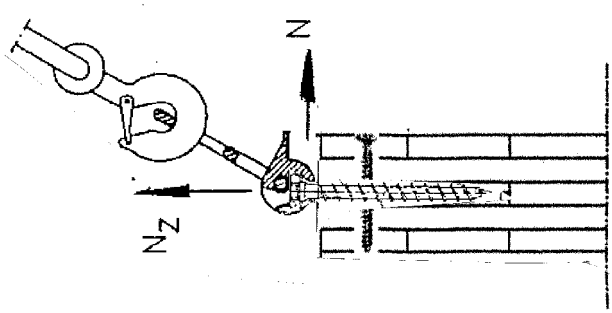
Fastening variant 2

Inclined loading on the screw



Transport anchor under inclined load

A force component acting perpendicular to the side may promote lateral tensile failure. Lateral tensile failure must be prevented by means of a reinforcement secured parallel to the face with full thread screws (see Figure below).



Full thread screws preventing lateral tensile failure in a cross-laminated timber element

Fastening variant "inclined tensile loading on screw"

Würth *ASSY*® 4 Combi T d = 10 mm, threaded length 145 mm (10x180/145)

Anchoring depth of the screw in the timber t_1 = 170 mm

Attached to **solid structural timber, glued laminated timber or to the side of cross-laminated timber**

(angle between screw axis and direction of grain α = 90°)

β	F_{Ed}	N_{SZ}	Load per attachment point				
°	in kN	in kN	kg				
			φ = 1.00	φ = 1.10	φ = 1.30	φ = 1.65	φ = 2.00
0	10.04	7.44	744	676	572	451	372
5	9.94	7.36	733	667	564	444	367
10	9.65	7.15	704	640	542	427	352
15	9.23	6.84	661	601	508	400	330
20	8.75	6.48	609	553	468	369	304
25	8.24	6.10	553	503	425	335	277
30	7.75	5.74	497	452	382	301	249
35	7.30	5.41	443	403	341	268	221
40	6.89	5.11	391	356	301	237	196
45	6.54	4.84	343	311	264	208	171
50	6.24	4.62	297	270	228	180	148
55	5.98	4.43	254	231	195	154	127
60	5.76	4.27	213	194	164	129	107

Attached to **the face of cross-laminated timber**

(angle between screw axis and direction of grain α = 0°)

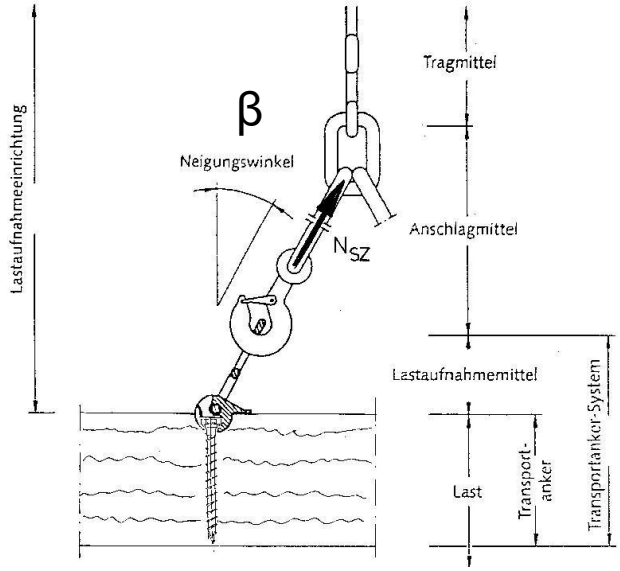
β	F_{Ed}	N_{SZ}	Load per attachment point				
°	in kN	in kN	kg				
			φ = 1.00	φ = 1.10	φ = 1.30	φ = 1.65	φ = 2.00
0	3.01	2.23	223	203	172	135	112
5	2.99	2.21	220	200	170	134	110
10	2.92	2.16	213	194	164	129	106
15	2.82	2.09	201	183	155	122	101
20	2.69	1.99	187	170	144	114	94
25	2.56	1.90	172	156	132	104	86
30	2.43	1.80	156	142	120	94	78
35	2.30	1.71	140	127	108	85	70
40	2.19	1.62	124	113	96	75	62
45	2.09	1.55	109	99	84	66	55
50	2.00	1.48	95	87	73	58	48
55	1.93	1.43	82	74	63	50	41
60	1.86	1.38	69	63	53	42	34

Assumptions: **Characteristic density ρk =350 kg/m³**
The thread is anchored completely in the wood, without gaps in the component
Screws arranged at the center of a layer in the faces

Fastening variant 3

Inclined loading on the screw with coupling head precision-fitted in cutout

When the coupling head of the load bearing equipment is **precision-fitted** in a cutout, it reroutes the horizontal force component of the inclined tensile load directly into the wood.



Transport anchor under inclined tensile load-coupling head of the load bearing equipment precision-fitted in a cutout

Fastening variant "inclined tensile loading on the screw with precision-fitted cutout"

Würth *ASSY*® 4 Combi T d = 10 mm, threaded length 145 mm

Attached to **solid structural timber, glued laminated timber, or to the side of cross-laminated timber**

(angle between screw axis and direction of grain α = 90°)

β	$F_{ax,Rd}$	N_z	**Load per attachment point**				
°	in	in	**kg**				
			φ =1.00	φ = 1.10	φ = 1.30	φ = 1.65	φ = 2.00
0 ÷ 60	10.04	7.44	744	676	572	451	372

Attached to **the face of cross-laminated timber**

(angle between screw axis and direction of grain α = 0°)

β	$F_{ax,Rd}$	N_z	**Load per attachment point**				
°	in	in	**kg**				
			φ =1.00	φ = 1.10	φ = 1.30	φ = 1.65	φ = 2.00
0 ÷ 60	3.01	2.23	223	203	172	135	112

Assumptions: **Characteristic density ρ_k =350 kg/m³**

The thread is anchored completely in the wood, without gaps in the component
Screws arranged at the center of a layer in the faces