

MADE FOR BUILDING

BUILT FOR LIVING

STRUCTURAL PRE-ANALYSIS TABLES

IMPRINT

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INTRODUCTION

STRUCTURAL PRE-ANALYSIS TABLES

The calculation of KLH solid wood panels is carried out under the aspect of flexibly connected cross sections. The longitudinal layers are connected via flexible transverse layers. Therefore, bending caused by transverse forces (shear deformations of the transverse layers, "rolling shear") can no longer be disregarded. Dimensioning and structural design follow the Eurocode 5 (EN 1995-1-1 and EN 1995-1-2), taking into account the national standards set forth in ÖNORM B 1995-1-1 and ÖNORM B 1995-1-2. It should be pointed out that the national standards in various European countries differ from each other in some detailed aspects (e.g. different component safety coefficients for "plywood board" material).

The product characteristics of the KLH solid wood panel required for structural design can be taken from the European Technical Approval (ETA-06/0138). The static test for KLH solid wood panels must be made separately for each project, and the locally applicable standards and regulations have to be followed. Due care is also advised when comparing panel thicknesses of KLH elements with

products by other manufacturers: due to different production processes, the plywood board products may well have different properties, e.g. as regards bending stiffness or shear strength. Please read the key values in the relevant product approvals and take into account the differences in the comparative calculation.

For the calculation of plywood board elements, different calculation methods have been developed. The calculation can be carried out with the so-called shear analogy, the Y-method or even as a girder grid. In practical construction work, the Y-method is most often used. It is an approximation method developed for flexibly connected bending girders, but is also applicable for plywood boards. Instead of the flexibility of the connecting devices, the shear deformation of the transverse layers is taken into account. In practical construction work, this method is sufficiently exact. It is also included in the DIN 1052 and the Eurocode 5. For structural design, the net moments of inertia are calculated with a reduction coefficient and the resulting effective moments of inertia provide verification.



STANDARD PANELS AND PANEL STRUCTURES

01 KLH STANDARD PANEL TYPES AND STRUCTURES

COVERING LAYER IN THE TRANSVERSE PANEL DIRECTION TT (WALL)

Nominal thickness	in layers	La	mella	structu	ıre [mr	n]	Standard panel widths	Maximum panel
in mm		Т	L	Т	L	Т	[m]	lengths [m]
57	3	19	19	19			2.40 / 2.50 / 2.72 / 2.05	16 50
							2.40 / 2.50 / 2.72 / 2.95	16.50
72	3 I	19	34	19			2.40 / 2.50 / 2.72 / 2.95	16.50
94	3	30	34	30			2.40 / 2.50 / 2.72 / 2.95	16.50
120	3 I	40	40	40			2.40 / 2.50 / 2.72 / 2.95	16.50
95	5 I	19	19	19	19	19	2.40 / 2.50 / 2.72 / 2.95	16.50
128	5 I	30	19	30	19	30	2.40 / 2.50 / 2.72 / 2.95	16.50
158	5 I	30	34	30	34	30	2.40 / 2.50 / 2.72 / 2.95	16.50

COVERING LAYER IN THE LONGITUDINAL PANEL DIRECTION TL (CEILING/ROOF)

Nominal thickness	in layers		La	mella	structu	re [mi	m]		Standard panel widths	Maximum panel
in mm		L	Т	L	Т	L	Т	L	[m]	lengths [m]
60	3	19	22	19					2.40 / 2.50 / 2.72 / 2.95	16.50
78	3	19	40	19					2.40 / 2.50 / 2.72 / 2.95	16.50
90	3	34	22	34					2.40 / 2.50 / 2.72 / 2.95	16.50
95	3	34	27	34					2.40 / 2.50 / 2.72 / 2.95	16.50
108	3	34	40	34					2.40 / 2.50 / 2.72 / 2.95	16.50
120	3	40	40	40					2.40 / 2.50 / 2.72 / 2.95	16.50
95	5 I	19	19	19	19	19			2.40 / 2.50 / 2.72 / 2.95	16.50
117	5 I	19	30	19	30	19			2.40 / 2.50 / 2.72 / 2.95	16.50
125	5 I	19	34	19	34	19			2.40 / 2.50 / 2.72 / 2.95	16.50
140	5 I	34	19	34	19	34			2.40 / 2.50 / 2.72 / 2.95	16.50
145	5 I	34	21.5	34	21.5	34			2.40 / 2.50 / 2.72 / 2.95	16.50
162	5 I	34	30	34	30	34			2.40 / 2.50 / 2.72 / 2.95	16.50
182	5 I	34	40	34	40	34			2.40 / 2.50 / 2.72 / 2.95	16.50
200	5 I	40	40	40	40	40			2.40 / 2.50 / 2.72 / 2.95	16.50
201	7 I	34	21.5	34	22	34	21.5	34	2.40 / 2.50 / 2.72 / 2.95	16.50
226	7 I	34	30	34	30	34	30	34	2.40 / 2.50 / 2.72 / 2.95	16.50
208	7 11	68	19	34	19	68			2.40 / 2.50 / 2.72 / 2.95	16.50
230	7 11	68	30	34	30	68			2.40 / 2.50 / 2.72 / 2.95	16.50
248	7 11	74	30	40	30	74			2.40 / 2.50 / 2.72 / 2.95	16.50
* 260	7 11	80	30	40	30	80			2.40 / 2.50 / 2.72 / 2.95	16.50
* 280	7 11	80	40	40	40	80			2.40 / 2.50 / 2.72 / 2.95	16.50
247	8 II	68	21.5	68	21.5	68			2.40 / 2.50 / 2.72 / 2.95	16.50
* 300	8 II	80	30	80	30	80			2.40 / 2.50 / 2.72 / 2.95	16.50
* 320	8 II	80	40	80	40	80			2.40 / 2.50 / 2.72 / 2.95	16.50

^{*} Special panel types

Special panel structures are available on request. By using double layers, for example the longitudinal or transverse rigidity of the panel can be further enhanced. The fire resistance of the KLH solid wood panel can also be influenced by modifying the structures and can eventually be improved in relation to specific project requirements.



02 KLH AS AN EXTERIOR WALL

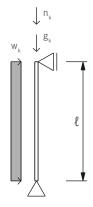
Wind pressure: $w_k = 0.80 \text{ kN/m}^2$

Minimum panel thicknesses for various fire resistance classes (R0 to R90)

according to approval ETA-06/0138

ÖNORM EN 1995-1-1:2009 and ÖNORM B 1995-1-1:2010

ÖNORM EN 1995-1-2:2011 and ÖNORM B 1995-1-2:2011



Constant	Imposed				ИЕТО	UT OF EV	TEDIOD W	/ALL /bal	kling lengt	h 0)			
load	load				ПЕТ	INT OF EX			Killig leligt	11, 1)			
g _k *)	n _k			0 m				2 m				5 m	
[kN/m]	[kN/m]	R 0	R 30	R 60	R 90	R 0	R 30	R 60	R 90	R 0	R 30	R 60	R 90
	10.00												
	20.00									3s 57 TT			
10.00	30.00	3s 57 TT	3s 94 TT	5s 95 TT	5s 128 TT	3s 57 TT	3c 94 TT	5s 95 TT	5s 128 TT	33 37 11	3s 94 TT	5s 95 TT	5s 128 TT
10.00	40.00	33 37 11	J3 J 4 11	03 00 11	33 120 11	03 07 11	03 54 11	03 00 11	33 120 11		33 34 11		33 120 11
	50.00									3s 72 TT			
	60.00									03 72 11		5s 125 TT	
	10.00												
	20.00							5s 95 TT		3s 57 TT		5s 95 TT	
20.00	30.00	3s 57 TT	3s 94 TT	5s 95 TT	5s 128 TT	3s 57 TT	3s 94 TT	00 00 11	5s 128 TT		3s 94 TT		5s 128 TT
20.00	40.00	03 07 11	00 01 11	00 00 11	00 120 11		000111				00 0 1 1 1		03 120 11
	50.00							5s 125 TT		3s 72 TT		5s 125 TT	
	60.00					3s 72 TT		00 120 11					
	10.00							5s 95 TT		3s 57 TT		5s 95 TT	
	20.00			5s 95 TT		3s 57 TT							5s 128 TT
30.00	30.00	3s 57 TT	3s 94 TT		5s 128 TT		3s 94 TT		5s 128 TT		3s 94 TT		
	40.00							5s 125 TT		3s 72 TT		5s 125 TT	
	50.00			5s 125 TT		3s 72 TT			F 150 TT				5s 158 TT
	60.00 10.00								5s 158 TT				
	20.00			5s 95 TT		2- E7 TT			F 100 TT	3s 57 TT			5s 128 TT
	30.00	3s 57 TT			5s 128 TT	3s 57 TT			5s 128 TT				
40.00	40.00	35 37 11	3s 94 TT		35 120 11		3s 94 TT	5s 125 TT			3s 94 TT	5s 125 TT	
	50.00			5s 125 TT		3s 72 TT			5s 158 TT	3s 72 TT			5s 158 TT
	60.00	3s 72 TT			5s 158 TT	35 / 2 11			35 136 11				
	10.00	35 /2 11			35 130 11				5s 128 TT				
	20.00				5s 128 TT	3s 57 TT			33 120 11				
	30.00	3s 57 TT			03 120 11		3s 94 TT				3s 94 TT		
50.00	40.00		3s 94 TT	5s 125 TT			555111	5s 125 TT	5s 158 TT	3s 72 TT		5s 125 TT	5s 158 TT
	50.00				5s 158 TT	3s 72 TT			03 100 11				
	60.00	3s 72 TT			03 100 11		5s 95 TT				5s 95 TT		
	10.00				5s 128 TT								
	20.00	3s 57 TT			13 120 11						3s 94 TT		
	30.00						3s 94 TT			3s 72 TT			
60.00	40.00	3s 94 TT 5s	5s 125 TT	5s 158 TT 3	2. 70 TT		5s 125 TT	5s 158 TT	-072.1		5s 125 TT	5s 158 TT	
	50.00		5s			- 05				5s 95 TT			
	60.00						5s 95 TT			3s 94 TT			

^{*)} in addition to the own weight of the KLH elements (the own weight of KLH is already taken into account in the table)



Service class 1

Imposed load category A (ψ_0 = 0.7 and ψ_2 = 0.3): k_{mod} = 0.8 Wind loads (ψ_0 = 0.6 and ψ_2 = 0): k_{mod} = 0.9

Load-bearing capacity

- a) Test as a buckling bar (compression and deflection according to equivalent beam method)
- b) Test of shear stress

Structural fire design (one-sided burn-off)

- a) Charring rate $\beta_{\scriptscriptstyle 0}$ = 0.67 mm/min if the burn-off only takes place in the covering layer or in the top double-layer
- b) Charring rate β_0 = 0.76 mm/min if several layers are affected (for the entire time of fire exposure)
- c) Additional eccentricity due to burn-off taken into account

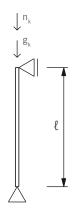


03 KLH AS AN INTERIOR WALL

No wind pressure

Minimum panel thicknesses for various fire resistance classes (R0 to R90) in case of one-sided fire exposure

according to approval ETA-06/0138 ÖNORM EN 1995-1-1:2009 and ÖNORM B 1995-1-1:2010 ÖNORM EN 1995-1-2:2011 and ÖNORM B 1995-1-2:2011



Constant	Imposed				HEIC	LIT OF IN	TEDIOD W	All /hual	ling lengt	h ρ\			
load	load				ПЕТ	INI OF IN			ing lengt	Π, τ)			
g _k *)	n _k			0 m			2.7				2.9		
[kN/m]	[kN/m]	R 0	R 30	R 60	R 90	R 0	R 30	R 60	R 90	R 0	R 30	R 60	R 90
	10.00												
	20.00												
10.00	30.00	3s 57 TT	3s 94 TT	5s 95 TT	5s 128 TT	3s 57 TT	3s 94 TT	5s 95 TT	5s 128 TT	3s 57 TT	3s 94 TT	5s 95 TT	5s 128 TT
	40.00												
	50.00												
	60.00									3s 72 TT		5s 125 TT	
	10.00												
	20.00							5s 95 TT		3s 57 TT		5s 95 TT	
20.00	30.00	3s 57 TT	3s 94 TT	5s 95 TT	5s 128 TT	3s 57 TT	3s 94 TT		5s 128 TT		3s 94 TT		5s 128 TT
	40.00											- 105	
	50.00							5s 125 TT		3s 72 TT		5s 125 TT	
	60.00											F OF TT	
	10.00							5s 95 TT				5s 95 TT	
	20.00 30.00			5s 95 TT		0. F7 TT			F. 100 TT	3s 57 TT			5s 128 TT
30.00	40.00	3s 57 TT	3s 94 TT		5s 128 TT	3s 57 TT	3s 94 TT		5s 128 TT		3s 94 TT	E- 10E TT	
	50.00							5s 125 TT				5s 125 TT	
	60.00			5s 125 TT		3s 72 TT			5s 158 TT	3s 72 TT			5s 158 TT
	10.00					33 /2 11			35 130 11				
	20.00			5s 95 TT					5s 128 TT	3s 57 TT			5s 128 TT
	30.00				5s 128 TT	3s 57 TT			03 120 11	03 07 11			
40.00	40.00	3s 57 TT	3s 94 TT		00 120 11		3s 94 TT	5s 125 TT			3s 94 TT	5s 125 TT	
	50.00			5s 125 TT					5s 158 TT	3s 72 TT			5s 158 TT
	60.00				5s 158 TT	3s 72 TT							
	10.00								5s 128 TT				
	20.00				5s 128 TT	3s 57 TT				3s 57 TT	0 04 77		
F0.00	30.00	3s 57 TT	2.04.77	F. 10F TT			2.04 TT	F. 10F TT			3s 94 TT	F. 10F TT	F. 150 TT
50.00	40.00		3s 94 TT	5s 125 TT			3s 94 TT	5s 125 TT	5s 158 TT	3s 72 TT		5s 125 TT	58 158 11
	50.00				5s 158 TT	3s 72 TT				35 /2 11	5s 95 TT		
	60.00	3s 72 TT									38 93 11		
	10.00				5s 128 TT	3s 57 TT					3s 94 TT		
	20.00	3c 57 TT				38 37 11	3s 94 TT				JS 34 11		
60.00	30.00	3s 57 TT	5c 125 TT			JS 34 11	5c 125 TT	5s 158 TT	3s 72 TT		5s 125 TT	5c 158 TT	
00.00	40.00		3s 94 TT 5s	5s 125 TT 5	I hs I hX I I I	TT 3c 72 TT		5s 125 11	J3 1J0 11	J3 / Z 11	5s 95 TT	J3 1ZJ 11	33 130 11
	50.00	3s 72 TT	3s 72 TT	5	33 130 11	3s 72 TT	5s 95 TT				03 00 11		
	60.00	33 / 2 1 1					03 00 11						

^{*)} in addition to the own weight of the KLH elements (the own weight of KLH is already taken into account in the table)



Service class 1

Imposed load category A (ψ_0 = 0.7 and ψ_2 = 0.3): k_{mod} = 0.8

Load-bearing capacity

a) Test as a buckling bar (compression according to equivalent beam method)

Structural fire design (one-sided burn-off)

- a) Charring rate β_0 = 0.67 mm/min if the burn-off only takes place in the covering layer or in the top double-layer
- b) Charring rate β_0 = 0.76 mm/min if several layers are affected (for the entire time of fire exposure)
- c) Additional eccentricity due to burn-off taken into account

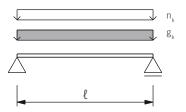


04 KLH AS A CEILING - SINGLE-SPAN GIRDER

4.1 VIBRATION TEST FOR LOW REQUIREMENTS

Minimum panel thicknesses for R0 (cold dimensioning)

according to approval ETA-06/0138 ÖNORM EN 1995-1-1:2009 and ÖNORM B 1995-1-1:2010 ÖNORM EN 1995-1-2:2011 and ÖNORM B 1995-1-2:2011



SPAN OF SINGLE-SPAN GIRDER,	5s 200 TL 7s 201 TL 7ss 208 TL 7ss 230 TL
Reference Cate Cate Reference Cate	- 5s 200 TL 7s 201 TL 7ss 230 TL 5s 200 TL 7s 201 TL 7s 201 TL 7ss 230 TL 7ss 230 TL
1.50	- 5s 200 TL 7s 201 TL 7ss 230 TL 5s 200 TL 7s 201 TL 7s 201 TL 7ss 230 TL 7ss 230 TL
1.00 A	7s 201 TL 7ss 230 TL 5s 200 TL 7s 201 TL 7ss 208 TL 7ss 230 TL
1.00 A 2.00 3s 78 TL 3s 90 TL 3s 108 TL 3s 120 TL 5s 140 TL 5s 145 TL 5s 162 TL 5s 182 TL 5s 200 TL	7s 201 TL 7ss 230 TL 5s 200 TL 7s 201 TL 7ss 208 TL 7ss 230 TL
1.00 B 3.00 3.50 3s 90 TL 3s 108 TL 3s 120 TL 5s 140 TL 5s 162 TL 5s 182 TL 5s 200 TL 7ss 208 TL 1.50 3s 78 TL 3s 90 TL 3s 108 TL 3s 120 TL 5s 140 TL 5s 140 TL 5s 162 TL 5s 182 TL 5s 200 TL 7ss 208 TL 3s 120 TL 5s 140 TL 5s 140 TL 5s 140 TL 5s 140 TL 5s 162 TL 5s 182 TL 5s 200 TL 7ss 208 TL 7ss	7s 201 TL 7ss 230 TL 5s 200 TL 7s 201 TL 7ss 208 TL 7ss 230 TL
1.00 B 3.00 3.50 3s 90 TL 3s 108 TL 3s 120 TL 5s 140 TL 5s 162 TL 5s 182 TL 5s 200 TL 7ss 208 TL 1.50 3s 78 TL 3s 90 TL 3s 90 TL 3s 108 TL 3s 120 TL 5s 140 TL 5s 140 TL 5s 140 TL 5s 162 TL 5s 182 TL 5s 200 TL 7ss 208 TL 1.50 3s 78 TL 3s 90 TL 3s 108 TL 3s 120 TL 5s 140 TL 5s 140 TL 5s 140 TL 5s 162 TL 5s 162 TL 5s 200 TL 7ss 208 TL 7s	7ss 230 TL 5s 200 TL 7s 201 TL 7ss 208 TL 7ss 230 TL
1.50 B 3.50 3s 95 TL 3s 120 TL 5s 140 TL 5s 140 TL 5s 162 TL 5s 182 TL 5s 200 TL 7ss 208 TL 3s 95 TL 3s 95 TL 3s 108 TL 3s 108 TL 3s 108 TL 3s 108 TL 5s 140 TL 5s 140 TL 5s 140 TL 5s 140 TL 5s 162 TL 5s 200 TL 7ss 208 TL 5s 200 TL 7ss 208 TL 5s 200 TL 7ss 208 TL 5s 162 TL 5s 162 TL 5s 162 TL 5s 200 TL 7ss 208 TL 7s	7ss 230 TL 5s 200 TL 7s 201 TL 7ss 208 TL 7ss 230 TL
C	5s 200 TL 7s 201 TL 7ss 208 TL 7ss 230 TL
1.50 3s 95 TL 3s 120 TL 5s 140 TL	5s 200 TL 7s 201 TL 7ss 208 TL 7ss 230 TL
1.50 B 3.00 3s 90 TL 3s 90 TL 3s 120 TL 5s 140 TL 5s 162 TL 5s 200 TL 3s 120 TL 5s 140 TL 5s 162 TL 5s 200 TL 5s 200 TL 5s 162 TL 5s 200 TL 7ss 208 TL 5s 162 TL 5s 162 TL 5s 200 TL 7ss 208 TL 7ss 20	7s 201 TL 7ss 208 TL 7ss 230 TL
1.50 B 3.00 3s 90 TL 3s 95 TL 3s 120 TL 5s 140 TL 5s 162 TL 5s 200 TL 5s 200 TL 5s 100	7ss 208 TL 7ss 230 TL
1.50 B 3.00 3s 90 TL 3s 95 TL 3s 120 TL 5s 140 TL 5s 145 TL 5s 200 TL 7ss 208 T 7ss 208 TL 7ss 2	7ss 230 TL
1.50 B 3.00 3s 95 TL 3s 120 TL 5s 140 TL 5s 145 TL 5s 200 TL 7ss 208 T 7ss 208 TL 7ss 20	7ss 230 TL
C 4.00 3s 95 TL 5.00 3s 108 TL 3s 120 TL 5s 140 TL 5s 145 TL 5s 145 TL 5s 182 TL 5s 200 TL 7ss 208 T 7ss 208 TL 7ss 208 TL 7ss 230 TL	
C 5.00 3s 108 TL 3s 120 TL 5s 140 TL 5s 162 TL 5s 182 TL 5s 200 TL 7ss 208 TL 7ss 230 T	
5.00 38 108 IL 58 102 IL 788 208 IL 788 230 I	700 240 TI
1 50 So 100 TI So 140 TI So 100 TI	7ss 248 TL
3c 9b 11 bc 162 11 bc 200 11	
A 2.00 5s 145 IL	
2.80 3s 90 TL 3s 120 TL 5s 140 TL 5s 200 TL 7 200 TL 7	7ss 208 TL
2.00 B 3.00 3s 108 TL 3S 120 TL 5s 162 TL 5s 182 TL 7ss 208 T	
3.50	
C 4.00 3s 95 TL 3s 120 TL 5s 140 TL 5s 162 TL 5s 182 TL 5s 200 TL 7ss 208 TL 7ss 230 T	7ss 248 TL
5.00 3s 108 TL 55 120 TL 55 140 TL 55 102 TL 55 200 TL 755 200 TL 755 200 TL	755 240 IL
1.50	7 200 TI
A 2.00	7ss 208 TL
2.80 3s 90 TL 3s 108 TL 3s 120 TL 5s 140 TL 5s 162 TL 5s 182 TL 5s 200 TL 7ss 208 T	
2.50 B 3.00	7ss 230 TL
C 4.00 3s 108 TL 3s 120 TL 5s 140 TL 5s 162 TL 5s 200 TL 7ss 208 TL 7ss 230 T	7 040 TI
C 5.00 3s 108 TL 5s 140 TL 5s 145 TL 5s 182 TL 7ss 208 TL 7ss 208 TL 7ss 248 T	7ss 248 TL
1 50 3c 120 TI 5c 182 TI	
A 2.00 3s 90 TL 3s 108 TL 5s 140 TL 5s 162 TL 5s 200 TL	
2.80 5 140 Tu 5 140 Tu 5 140 Tu 7 7 8 20 8 Tu 7 8 20 8	7ss 230 TL
3.00 S 3.	
3.50 3s 95 TL 3s 120 TL	
4 00 Se 145 TI Se 230 T	7ss 248 TL
C 5.00 3s 108 TL 5s 140 TL 5s 162 TL 5s 182 TL 5s 200 TL 7ss 208 TL 7ss 230 TL 7ss 248 T	

^{*)} in addition to the own weight of the KLH elements (the own weight of KLH is already taken into account in the table)

Service class 1

$$k_{def} = 0.8$$

Imposed load category A and B (ψ_0 = 0.7 and ψ_2 = 0.3): k_{mod} = 0.8 Imposed load category C (ψ_0 = 0.7 and ψ_2 = 0.6): k_{mod} = 0.9

Deflection limits according to ÖNORM EN 1995-1-1:2010

- a) characteristic structural design situation: $w_{Q,inst} \le \ell/300$ and $(w_{fin} w_{G,inst}) \le \ell/200$
- b) quasi-permanent structural design situation: $w_{fin} \le \ell/250$

Vibration test according to Eurocode 5 and Kreuzinger / Mohr

- a) Attenuation factor ς = 2.5 %; cement screed 5 cm; room width b = 1.2* ℓ
- b) $f_1 \ge 4.5$ Hz; $w_F \le 1.5$ mm/kN; $v < v_{limit}$; a < 0.40 m/s 2 (vibrations noticeable but not disturbing)

Load-bearing capacity

- a) Test of bending stress
- b) Test of shear stress

Structural fire design (one-sided burn-off)

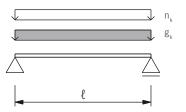
- a) Charring rate $\beta_0 = 0.67$ mm/min if the burn-off only takes place in the covering layer or in the top double-layer
- b) Charring rate $\beta_0 = 0.76$ mm/min if several layers are affected (for the entire time of fire exposure)
- c) The minimum panel thicknesses (for R0) automatically reach fire resistance according to coloured marking



4.2 VIBRATION TEST FOR INCREASED REQUIREMENTS

Minimum panel thicknesses for R0 (cold dimensioning)

according to approval ETA-06/0138 ÖNORM EN 1995-1-1:2009 and ÖNORM B 1995-1-1:2010 ÖNORM EN 1995-1-2:2011 and ÖNORM B 1995-1-2:2011



Constant	t Ir	nposed				SPAN OF S	INGLE-SPAN	GIRDER. {			
load		load									
g _k *)		n _k	3.00 m	3.50 m	4.00 m	4.50 m	5.00 m	5.50 m	6.00 m	6.50 m	7.00 m
[kN/m ²]	CAT	[kN/m²]	0.00 111		1.00 111	1.00 111	0.00 111	0.00	0.00 111	0.00	7.00
		1.50	3s 78 TL	3s 90 TL			5s 162 TL				
	Α	2.00	33 70 TL	3s 95 TL		5s 140 TL	33 102 TE				
		2.80		33 33 TE	3s 120 TL	J3 140 IL				7ss 208 TL	7ss 230 TL
1.00	В	3.00	3s 90 TL	3s 108 TL			5s 182 TL	5s 200 TL	7ss 208 TL		
		3.50		33 100 TE		5s 145 TL	33 102 12				
	С	4.00	3s 95 TL	3s 120 TL	5s 140 TL	5s 182 TL				7ss 230 TL	7ss 248 TL
	ļ ŭ	5.00	3s 108 TL	33 120 TE	5s 162 TL	33 102 12	5s 200 TL			733 230 12	7ss 260 TL
		1.50			3s 120 TL	5s 145 TL				7s 201 TL	7ss 208 TL
	A	2.00			00 120 12	001.0.2	5s 182 TL			, 0 2 0 1 1 2	700 200 12
	<u> </u>	2.80	3s 90 TL	3s 108 TL					7s 201 TL		
1.50	В	3.00			5s 140 TL	5s 162 TL		5s 200 TL		7ss 208 TL	7ss 230 TL
		3.50									
	С	4.00	3s 95 TL	3s 120 TL	5s 145 TL	- 100 TI	5s 200 TL		7ss 208 TL	7ss 230 TL	7ss 248 TL
	-	5.00	3s 108 TL	5s 140 TL	5s 162 TL	5s 182 TL				7ss 248 TL	7ss 260 TL
		1.50		3s 108 TL							
A	A	2.00	3s 90 TL	90 TL	5s 162 TL			7. 001 TI	7 000 TI	7ss 230 TL	
2.00	-	3.00			58 140 IL		5s 200 TL	5s 200 TL	7s 201 TL	7ss 208 TL	
2.00	В	3.50		35 120 IL			35 200 TL				7ss 248 TL
		4.00				5s 182 TL			7ss 208 TL		7ss 240 TL
	С	5.00	3s 108 TL	5s 140 TL	5s 162 TL	J3 102 1L		7s 201 TL	7ss 230 TL	7ss 248 TL	7ss 280 TL
		1.50				5s 162 TL		73 201 12	733 230 TE		7ss 230 TL
	A	2.00	3s 90 TL			03 102 12			7s 201 TL	7ss 208 TL	733 200 12
	'`	2.80		3s 120 TL	5s 140 TL			5s 200 TL	, 0 201 12		
2.50		3.00	3s 95 TL				5s 182 TL			7ss 230 TL	7ss 248 TL
	В	3.50				5s 182 TL			7ss 208 TL		
		4.00	0 100 TI	5 140 TI	5 160 TI			7s 201 TL	7 000 TI	7 040 TI	7 000 TI
	С	5.00	3s 108 TL	5s 140 TL	5s 162 TL		5s 200 TL	7ss 208 TL	7ss 230 TL	7ss 248 TL	7ss 280 TL
		1.50			5s 140 TL						
А	Α	2.00	3s 95 TL								7ss 248 TL
		2.80	38 33 IL	L 3s 120 TL 5	5s 145 TL		5s 182 TL	5s 200 TL	7ss 208 TL	7ss 230 TL	755 Z40 IL
3.00	В	3.00				5s 182 TL					
		3.50	3s 108 TL								7ss 260 TL
	С	4.00		5s 140 TL	5s 162 TL	L	5s 200 TL	TL 7ss 208 TL	7ss 230 TL	7ss 248 TL	7ss 280 TL
		5.00	3s 120 TL	33 140 1L			03 200 IL	733 200 TL	733 230 TL	7ss 260 TL	8ss 300 TL

^{*)} in addition to the own weight of the KLH elements (the own weight of KLH is already taken into account in the table)

Service class 1

$$k_{def} = 0.8$$

Imposed load categories A and B (ψ_0 = 0.7 and ψ_2 = 0.3): k_{mod} = 0.8 Imposed load category C (ψ_0 = 0.7 and ψ_2 = 0.6): k_{mod} = 0.9

Deflection limits according to ÖNORM EN 1995-1-1:2010

- a) characteristic structural design situation: $w_{Q,inst} \le \ell/300$ and $(w_{fin} w_{G,inst}) \le \ell/200$
- b) quasi-permanent structural design situation: $w_{fin} \le \ell/250$

Vibration test according to Eurocode 5 and Kreuzinger / Mohr

- a) Attenuation factor ς = 2.5 %; cement screed 5 cm; room width b = 1.2* ℓ
- b) $f_1 \ge 4.5$ Hz; $w_F \le 1.5$ mm/kN; $v < v_{limit}$; a < 0.10 m/s 2 (vibrations considered to be disturbing)
- c) Vibration acceleration was tested with an imposed load of the category C, in addition with $\psi_2 = 0.3$

Load-bearing capacity

- a) Test of bending stress
- b) Test of shear stress

Structural fire design (one-sided burn-off)

- a) Charring rate $\beta_0 = 0.67$ mm/min if the burn-off only takes place in the covering layer or in the top double-layer
- b) Charring rate $\beta_0 = 0.76$ mm/min if several layers are affected (for the entire time of fire exposure)
- c) The minimum panel thicknesses (for R0) automatically reach fire resistance according to coloured marking

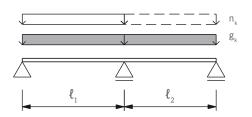


05 KLH AS A CEILING - DOUBLE-SPAN GIRDER

5.1 VIBRATION TEST FOR LOW REQUIREMENTS

Minimum panel thicknesses for R0 (cold dimensioning) Imposed load not favourable in some spans

according to approval ETA-06/0138 ÖNORM EN 1995-1-1:2009 and ÖNORM B 1995-1-1:2010 ÖNORM EN 1995-1-2:2011 and ÖNORM B 1995-1-2:2011



Constant	In	nposed													
load		load		S	PAN OF DOU	BLE-SPAN G	IRDER ℓ₁	{ ₂ :	= 0.8* ℓ_1 to 1	O*ℓ ₁					
g _k *)		n _k													
[kN/m ²]	CAT	[kN/m²]	3.00 m	3.50 m	4.00 m	4.50 m	5.00 m	5.50 m	6.00 m	6.50 m	7.00 m				
		1.50	3s 57 TL		3s 78 TL			3s 120 TL			5s 140 TL				
	Α	2.00	35 37 TL	3s 78 TL		3s 90 TL	3s 108 TL	35 120 TL		5s 140 TL	5s 145 TL				
		2.80		JS 70 IL	3s 90 TL		35 100 TL		5s 140 TL		5s 162 TL				
1.00	В	3.00	3s 78 TL		33 30 11	3s 95 TL		5s 140 TL		5s 145 TL					
		3.50	03 70 TE	3s 90 TL		3s 108 TL	3s 120 TL			5s 162 TL	5s 182 TL				
	С	4.00			3s 108 TL	3s 120 TL	5s 140 TL	5s 145 TL	5s 162 TL	5s 182 TL	5s 200 TL				
		5.00	3s 90 TL	3s 95 TL	33 100 TE			5s 162 TL	5s 182 TL	5s 200 TL	7s 201 TL				
		1.50				3s 90 TL	3s 108 TL			5s 140 TL	5s 162 TL				
	Α	2.00		3s 78 TL		3s 95 TL				5s 145 TL	00 102 .2				
		2.80	3s 78 TL		3s 90 TL		3s 120 TL	5s 140 TL	5s 140 TL						
1.50	В	3.00				3s 108 TL	00 120 12			5s 162 TL	5s 182 TL				
	_	3.50		3s 90 TL											
	С	4.00	3s 90 TL		3s 108 TL	3s 120 TL	5s 140 TL	5s 162 TL	5s 182 TL	5s 200 TL	7s 201 TL				
		5.00		3s 95 TL	3s 120 TL	5s 140 TL					7ss 208 TL				
		1.50		3s 78 TL					5s 140 TL						
	Α	2.00	2 70 TI		3s 90 TL	2 100 TI	2 100 TI	5 140 TI		5s 162 TL	5s 182 TL				
0.00		2.80	3s 78 TL 3s 90 TL	3s 78 TL	3s 78 TL 3	3s /8 TL	3s /8 TL	3s 90 TL		3s 108 TL	3s 120 TL	5s 140 TL	5s 145 TL		
2.00	В	3.00		2- 0F TI	-			F. 100 TI	F. 100 TI	F- 200 TI					
		4.00		3s 95 TL	3s 95 TL		5s 140 TL	5s 162 TL	5s 162 TL	5s 182 TL	5s 200 TL				
	С	5.00	3s 90 TL	3s 108 TL	3s 108 TL 3s 120 TL	5s 140 TL	5s 140 TL	5s 162 TL	5s 182 TL	5s 200 TL	7ss 208 TL				
		1.50		35 100 IL			35 143 TL	35 102 IL	5s 200 TL	5s 162 TL					
	A	2.00			3s 90 TL	3s 108 TL	3s 120 TL		5s 145 TL	35 102 TL	5s 182 TL				
	A	2.80	3s 78 TL	3s 90 TL				5s 140 TL							
2.50		3.00	35 70 IL	35 90 TL	3s 95 TL	3s 120 TL	5s 140 TL	JS 140 TL	5s 162 TL	5s 182 TL	5s 200 TL				
2.50	В	3.50			3s 108 TL	33 120 12	33 140 12		33 102 12		33 200 TE				
		4.00		3s 95 TL			5s 145 TL	5s 162 TL		5s 200 TL					
	С	5.00	3s 90 TL	3s 108 TL	3s 120 TL	5s 140 TL	5s 162 TL	5s 182 TL	5s 200 TL	7s 201 TL	7ss 208 TL				
		1.50		00 100 12			3s 120 TL			70 201 12					
	Α	2.00			3s 95 TL			5s 140 TL							
		2.80	3s 78 TL	3s 90 TL		3s 120 TL	5 140 E		5s 162 TL	5s 182 TL	5s 200 TL				
3.00		3.00			3s 108 TL		hc / ()	5s 145 TL							
	В	3.50				S 100 IL			5s 182 TL	5s 200 TL					
		4.00	3s 90 TL	2. 100 71	3s 108 TL	F. 100 TI	F. 100 TI		7s 201 TL	7ss 208 TL					
	С	5.00		38 108 IL	38 120 IL	58 140 IL	5s 162 TL	5s 182 TL	5s 200 TL	7ss 208 TL	7ss 230 TL				

^{*)} in addition to the own weight of the KLH elements (the own weight of KLH is already taken into account in the table)

Service class 1

$$k_{def} = 0.8$$

Imposed load category A and B (ψ_0 = 0.7 and ψ_2 = 0.3): k_{mod} = 0.8 Imposed load category C (ψ_0 = 0.7 and ψ_2 = 0.6): k_{mod} = 0.9

Deflection limits according to ÖNORM EN 1995-1-1:2010

- a) characteristic structural design situation: $w_{Q,inst} \le \ell/300$ and $(w_{fin} w_{G,inst}) \le \ell/200$
- b) quasi-permanent structural design situation: $w_{fin} \le \ell/250$

Vibration test according to Eurocode 5 and Kreuzinger / Mohr

- a) Attenuation factor ς = 2.5 %; cement screed 5 cm; room width b = 1.2* ℓ
- b) $f_1 \ge 4.5$ Hz; $w_F \le 1.0$ mm/kN; $v < v_{limit}$; a < 0.40 m/s² (vibrations noticeable but not disturbing)

Load-bearing capacity

- a) Test of bending stress
- b) Test of shear stress

Structural fire design (one-sided burn-off)

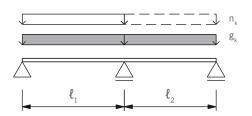
- a) Charring rate $\beta_{\scriptscriptstyle 0}$ = 0.67 mm/min if the burn-off only takes place in the covering layer or in the top double-layer
- b) Charring rate $\beta_0 = 0.76$ mm/min if several layers are affected (for the entire time of fire exposure)
- c) The minimum panel thicknesses (for R0) automatically reach fire resistance according to coloured marking



5.2 VIBRATION TEST FOR INCREASED REQUIREMENTS

Minimum panel thicknesses for R0 (cold dimensioning) Imposed load not favourable in some spans

according to approval ETA-06/0138 ÖNORM EN 1995-1-1:2009 and ÖNORM B 1995-1-1:2010 ÖNORM EN 1995-1-2:2011 and ÖNORM B 1995-1-2:2011



Constant	In	nposed										
load		load		SI	PAN OF DOU	BLE-SPAN G	IRDER, ℓ,	l,	$= 0.8*\ell_1 \text{ to } 1$	1,0*ℓ,		
g _k *)		n _k										
[kN/m ²]	CAT	[kN/m²]	3.00 m	3.50 m	4.00 m	4.50 m	5.00 m	5.50 m	6.00 m	6.50 m	7.00 m	
		1.50	3s 60 TL	3s 78 TL	3s 90 TL			5s 162 TL			5s 182 TL	
	Α	2.00	35 00 TL	33 70 TL	3s 95 TL	3s 120 TL	5s 140 TL	JS 102 TL			JS 102 TL	
		2.80				33 120 TE	33 140 TL		5s 182 TL	5s 182 TL		
1.00	В	3.00	3s 78 TL	3s 90 TL	3s 108 TL				00 102 12		5s 200 TL	
	_	3.50	00 / 0 1 2			5s 140 TL	5s 145 TL	5s 182 TL				
	С	4.00		3s 108 TL	5s 140 TL	5s 145 TL	5s 162 TL			5s 200 TL	7ss 230 TL	
	-	5.00	3s 90 TL			5s 162 TL			5s 200 TL	7ss 208 TL		
		1.50					5s 145 TL					
	Α	2.00	2- 70 DI	2- 00 TI	3s 108 TL	5s 140 TL			F - 100 TI	F - 100 TI	5s 200 TL	
1.50		3.00	3s 78 DL	3s 90 TL		58 140 IL		5s 182 TL	5s 182 TL	5s 182 TL		
1.50	В	3.50			3s 120 TL	-	5s 162 TL	35 102 IL		-	7s 201 TL	
	c 4.	4.00		3s 108 TL			J 33 102 1L				7ss 230 TL	
	C	5.00	3s 90 TL	3s 120 TL	5s 140 TL	5s 162 TL			5s 200 TL	7ss 208 TL	7ss 248 TL	
		1.50		00 120 12	3s 108 TL					5s 182 TL	5s 200 TL	
A	2.00	2c 70 TI	3s 90 3s 78 TL 3s 95	3s 90 TL								
		2.80		3s 78 TL		2. 100 TI	5s 140 TL		5s 162 TL	5s 182 TL	F . 000 TI	7 000 TI
2.00	В	3.00		20 05 TI	38 120 IL	58 140 IL	5s 162 TL			5s 200 TL	7ss 208 TL	
	В	3.50		38 95 IL								
	С	4.00	3s 90 TL	3s 120 TL	5s 140 TL			5s 182 TL	5s 200 TL	7ss 208 TL	7ss 248 TL	
		5.00	JS 90 IL	33 120 TL	JS 140 TL	5s 145 TL		JS 102 TL	7s 201 TL	7ss 230 TL	735 Z40 TL	
		1.50		3s 95 TL		5s 140 TL					7ss 208 TL	
	Α	2.00			3s 120 TL	001.0.2					, 00 200 12	
0.50		2.80	3s 78 TL			- 445	- 100 TI	5s 162 TL	5s 182 TL	5s 200 TL	7 000 71	
2.50	В	3.00		3s 108 TL		5s 145 TL	5s 162 TL				7ss 230 TL	
		4.00			5s 140 TL				F- 200 TI			
	С	5.00	3s 90 TL	3s 120 TL	35 140 IL	5s 162 TL		5s 182 TL	5s 200 TL 7ss 208 TL	7ss 230 TL	7ss 248 TL	
		1.50								5s 200 TL		
	Α	2.00	3s 78 TL			5s 145 TL			5s 182 TL	7s 201 TL		
	'`	2.80		3s 108 TL				5s 162 TL		, 3 2 01 12	7ss 230 TL	
3.00		3.00		2020012	5s 140 TL		5s 162 TL		5s 200 TL	7ss 208 TL	30 200 . 2	
	В	3.50	3s 90 TL			5s 162 TL						
		4.00		0.100.71		5s 162 TL		5s 182 TL	7s 201 TL	7 020 TI	7ss 248 TL	
	С	5.00	3s 95 TL	3s 120 TL				5s 200 TL	7ss 208 TL	7ss 230 TL	7ss 260 TL	

L١) in addition to the own	: . 1. 4 . C +1 IZI II .	1 4 - /+1	:-1-4 - CIZI II:1		
•	i in addition to the owr	i weloni oi ine k i H e	nwn ann amania	Weldni of K I H is air	eany raken into	. account in the table
	illi daditioli to tile owi.	I WCIEIL OI LIC ILLII C	ACTION OF THE CONTRACTOR	WCIgiil Oi ithii is aii	caay taixcii iiito	account in the table

Service class 1

$$k_{def} = 0.8$$

Imposed load category A and B (ψ_0 = 0.7 and ψ_2 = 0.3): k_{mod} = 0.8 Imposed load category C (ψ_0 = 0.7 and ψ_2 = 0.6): k_{mod} = 0.9

Deflection limits according to ÖNORM EN 1995-1-1:2010

- a) characteristic structural design situation: $w_{Q,inst} \le \ell/300$ and $(w_{fin} w_{G,inst}) \le \ell/200$
- b) quasi-permanent structural design situation: $w_{fin} \le \ell/250$

Vibration test according to Eurocode 5 and Kreuzinger / Mohr

- a) Attenuation factor $\varsigma = 2.5$ %; cement screed 5 cm; room width b = 1.2* ℓ
- b) $f_1 \ge 4.5$ Hz; $w_F \le 1.0$ mm/kN; $v < v_{limit}$; a < 0.10 m/s 2 (vibrations considered to be disturbing)
- c) Vibration acceleration was tested with an imposed load of the category C, in addition with ψ_2 = 0.3

Load-bearing capacity

- a) Test of bending stress
- b) Test of shear stress

Structural fire design (one-sided burn-off)

- a) Charring rate β_0 = 0.67 mm/min if the burn-off only takes place in the covering layer or in the top double-layer
- b) Charring rate $\beta_0 = 0.76$ mm/min if several layers are affected (for the entire time of fire exposure)
- c) The minimum panel thicknesses (for R0) automatically reach fire resistance according to coloured marking

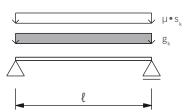


06 KLH AS A ROOF - SINGLE-SPAN GIRDER

Deflection

Appearance and avoidance of damage Minimum panel thicknesses for R0 (cold dimensioning)

according to approval ETA-06/0138 ÖNORM EN 1995-1-1:2009 and ÖNORM B 1995-1-1:2010 ÖNORM EN 1995-1-2:2011 and ÖNORM B 1995-1-2:2011



Constant	Snow load									
load	on roof				SPAN OF S	INGLE-SPAN	GIRDER, &			
g,*)	s = µ*s,									
[kN/m²]	[kN/m²]	3.00 m	3.50 m	4.00 m	4.50 m	5.00 m	5.50 m	6.00 m	6.50 m	7.00 m
	1.00	3s 57 TL	2 - 70 TI	3s 78 TL	3s 90 TL	3s 95 TL	3s 108 TL	3s 120 TL	F. 140 TI	5s 145 TL
	2.00	2 - 70 TI	3s 78 TL	3s 90 TL	3s 95 TL	3s 108 TL	3s 120 TL	5s 140 TL	5s 140 TL	5s 162 TL
	3.00	3s 78 TL	3s 90 TL	3s 95 TL	3s 108 TL	3s 120 TL	5s 140 TL	5s 145 TL	5s 162 TL	5s 182 TL
0.50	4.00		35 90 TL	3s 108 TL	3s 120 TL	5s 140 TL	5s 145 TL	5s 162 TL	5s 182 TL	5s 200 TL
	5.00	3s 90 TL	3s 108 TL	3s 120 TL	5s 140 TL	5s 145 TL	5s 162 TL	5s 182 TL	5s 200 TL	7ss 208 TL
	6.00		35 100 IL	35 120 TL	35 140 TL	5s 162 TL	5s 182 TL	5s 200 TL	7ss 208 TL	755 200 TL
	7.00	3s 95 TL	3s 120 TL	5s 140 TL	5s 145 TL	5s 182 TL	5s 200 TL	35 200 TL	755 200 TL	7ss 230 TL
	1.00		3s 78 TL	3s 90 TL	3s 95 TL	3s 108 TL	3s 120 TL	5s 140 TL		
	2.00	3s 78 TL	33 70 TE	33 30 TE	33 33 TE	33 100 TE	33 120 TL	33 140 TL	5s 162 TL	5s 182 TL
	3.00		3s 90 TL	3s 95 TL	3s 108 TL	3s 120 TL	5s 140 TL	5s 145 TL		
1.00	4.00		33 70 TE	3s 108 TL	3s 120 TL	5s 140 TL	5s 145 TL	5s 162 TL	5s 182 TL	5s 200 TL
	5.00	3s 90 TL	3s 108 TL	3s 120 TL	5s 140 TL	5s 145 TL	5s 162 TL	5s 182 TL	5s 200 TL	7ss 208 TL
	6.00					5s 162 TL	5s 182 TL	5s 200 TL	7ss 208 TL	
	7.00	3s 95 TL	3s 120 TL	5s 140 TL	5s 145 TL	5s 182 TL	5s 200 TL	03 200 12	733 200 12	7ss 230 TL
	1.00									
	2.00	3s 78 TL	3s 90 TL	3s 95 TL	3s 108 TL	3s 120 TL	5s 140 TL	5s 162 TL	L 5s 182 TL	5s 200 TL
	3.00		- 03 30 12					00 102 12	03 102 12	03 200 12
1.50	4.00			3s 108 TL	3s 120 TL	5s 140 TL	5s 145 TL			
	5.00	3s 90 TL	3s 108 TL	3s 120 TL	5s 140 TL	5s 145 TL	5s 162 TL	5s 182 TL	5s 200 TL	7ss 208 TL
	6.00					5s 162 TL	5s 182 TL	5s 200 TL	7ss 208 TL	
	7.00	3s 95 TL	3s 120 TL	5s 140 TL	5s 145 TL	5s 182 TL	5s 200 TL			7ss 230 TL
	1.00									
	2.00	3s 78 TL	3s 90 TL	3s 108 TL	3s 120 TL	5s 140 TL				5s 200 TL
	3.00		-				5s 162 TL	5s 182 TL	5s 200 TL	
2.00	4.00	0 00 71				5 445 71	_			
	5.00	3s 90 TL	3s 108 TL	3s 120 TL	5s 140 TL	5s 145 TL	5 100 TI			7ss 208 TL
	6.00	2 05 71	2 100 TI	5 140 TI	5 145 TI	5s 162 TL	5s 182 TL	5s 200 TL	7ss 208 TL	7 000 TI
	7.00	3s 95 TL	3s 120 TL	5s 140 TL	5s 145 TL	5s 182 TL	5s 200 TL			7ss 230 TL
	1.00									
	2.00		3s 95 TL			5s 140 TL	5s 162 TL	5 100 TI	TI 5c 200 TI	
2.50	3.00	3s 90 TL		3s 120 TL	5s 140 TL			5s 182 TL	5s 200 TL	7ss 208 TL
2.50	4.00			3\$ 120 TL		E- 145 T				
	5.00		3s 108 TL	TL		5s 145 TL	5s 182 TL			
	6.00	20 05 TI	20 120 TI	E 0 1/10 TI	50 1/5 TI	5s 162 TL	50 200 TI	5s 200 TL	7ss 208 TL	700 220 TI
	7.00	3s 95 TL	3s 120 TL	5s 140 TL	5s 145 TL	5s 182 TL	5s 200 TL			7ss 230 TL

^{*)} in addition to the own weight of the KLH elements (the own weight of KLH is already taken into account in the table)



Service class 1

 $k_{def} = 0.8$

Snow load at an altitude ≤ 1.000 m above sea level ($\psi_0 = 0.5$ and $\psi_2 = 0$): $k_{mod} = 0.9$

Deflection limits according to ÖNORM EN 1995-1-1:2010

- a) characteristic structural design situation: $w_{Q,inst} \le \ell/300$ and $(w_{fin} w_{G,inst}) \le \ell/200$
- b) quasi-permanent structural design situation: $w_{fin} \le \ell/250$

Load-bearing capacity

- a) Test of bending stress
- b) Test of shear stress

Structural fire design (one-sided burn-off)

- a) Charring rate $\beta_0 = 0.67$ mm/min if the burn-off only takes place in the covering layer or in the top double-layer
- b) Charring rate $\beta_0 = 0.76$ mm/min if several layers are affected (for the entire time of fire exposure)
- c) The minimum panel thicknesses (for R0) automatically reach fire resistance according to coloured marking

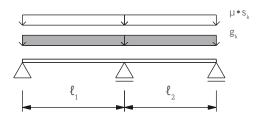


07 KLH AS A ROOF - DOUBLE-SPAN GIRDER

Deflection

Appearance and avoidance of damage Minimum panel thicknesses for R0 (cold dimensioning) Snow load evenly distributed on both spans

according to approval ETA-06/0138 ÖNORM EN 1995-1-1:2009 and ÖNORM B 1995-1-1:2010 ÖNORM EN 1995-1-2:2011 and ÖNORM B 1995-1-2:2011



Constant	Snow load									
load	on roof		SPA	AN OF DOUB	LE-SPAN GIF	RDER, l,	ℓ ₂ =	0,8*ℓ, to 1,0) *ℓ,	
g _k *)	$s = \mu^* s_k$							*	*	
[kN/m²]	[kN/m²]	3.00 m	3.50 m	4.00 m	4.50 m	5.00 m	5.50 m	6.00 m	6.50 m	7.00 m
	1.00		3s 57 TL		3s 78 TL	3s 90 TL	3s 90 TL	3s 95 TL	3s 108 TL	3s 120 TL
	2.00	3s 57 TL	35 37 TL	3s 78 TL	J5 70 TL	35 90 TL		35 93 TL	33 100 TL	
	3.00		3s 78 TL		3s 90 TL	3s 95 TL	3s 108 TL	3s 120 TL	3s 120 TL	5s 140 TL
0.50	4.00		33 70 TE	3s 90 TL	33 30 12	3s 108 TL	3s 120 TL	5s 140 TL	5s 140 TL	5s 145 TL
	5.00	3s 78 TL			3s 108 TL	3s 120 TL			5s 145 TL	5s 162 TL
	6.00	037012	3s 90 TL	3s 95 TL			5s 140 TL	5s 145 TL	5s 162 TL	
	7.00			3s 108 TL	3s 120 TL	5s 140 TL		5s 162 TL	5s 182 TL	5s 182 TL
	1.00					3s 90 TL	3s 90 TL	3s 108 TL		
	2.00	3s 57 TL	3s 78 TL	3s 78 TL	3s 90 TL				3s 120 TL	5s 140 TL
1.00	3.00				-	3s 95 TL	3s 108 TL	3s 120 TL	5 140 TI	5 145 71
1.00	4.00			3s 90 TL		3s 108 TL	3s 120 TL	5s 140 TL	5s 140 TL	5s 145 TL
	5.00	3s 78 TL	2 22 71	2 05 71	3s 108 TL	3s 120 TL	5 140 TI		5s 162 TL	5s 162 TL
	6.00	-	3s 90 TL	3s 95 TL	2. 100 TI	F. 140 TI	5s 140 TL	5s 145 TL		5s 182 TL
	7.00			3s 108 TL	3s 120 TL	5s 140 TL		5s 162 TL	5s 182 TL	5s 200 TL
	2.00	3s 57 TL				3s 90 TL	3s 108 TL	3s 120 TL		5s 140 TL
	3.00	35 37 IL	3s 78 TL	3s 90 TL	3s 90 TL	3s 95 TL	J 33 100 1L	03 120 12	5s 140 TL	03 140 TE
1.50	4.00					3s 108 TL	3s 120 TL	5 140 TI		5s 145 TL
	5.00				0 100 71			5s 140 TL	5s 162 TL	5s 162 TL
	6.00	3s 78 TL	3s 90 TL	3s 95 TL	3s 108 TL	3s 120 TL	5s 140 TL	5s 145 TL	5 100 TI	5s 182 TL
	7.00			3s 108 TL	3s 120 TL	5s 140 TL		5s 162 TL	5s 182 TL	5s 200 TL
	1.00									
	2.00		3s 78 TL		3s 90 TL	3s 108 TL	3s 120 TL		5s 140 TL	5s 145 TL
	3.00		35 / 0 IL	3s 90 TL		35 100 IL	35 120 TL	5s 140 TL	35 140 TL	
2.00	4.00	3s 78 TL			3s 95 TL					5s 162 TL
	5.00				3s 108 TL	3s 120 TL	5s 140 TL		5s 162 TL	5s 182 TL
	6.00		3s 90 TL	3s 95 TL	3s 120 TL			5s 145 TL	5s 182 TL	5s 200 TL
	7.00			3s 108 TL	33 120 12	5s 140 TL	5s 145 TL	5s 162 TL	5s 200 TL	33 200 TE
	1.00									
	2.00				3s 95 TL	3s 108 TL	3s 120 TL	5s 140 TL	5s 145 TL	5s 162 TL
	3.00			3s 90 TL						
2.50	4.00		3s 90 TL		0 100 =:	0 100 =:		5 145 T	F 100 F	F 100 T
	5.00			3s 95 TL 3s 120	3s 108 TL	3s 120 TL	5s 140 TL	5s 145 TL	5s 162 TL	5s 182 TL
	6.00				3s 120 TL	5s 140 TL		5s 162 TL	5s 182 TL	5s 200 TL
	7.00	3s 90 TL		3s 108 TL			5s 162 TL	5s 182 TL	5s 200 TL	

^{*)} in addition to the own weight of the KLH elements (the own weight of KLH is already taken into account in the table)



Service class 1

 $k_{def} = 0.8$

Snow load at an altitude \leq 1.000m above sea level (ψ_0 = 0.5 and ψ_2 = 0): k_{mod} = 0.9

Deflection limits according to ÖNORM EN 1995-1-1:2010

- a) characteristic structural design situation: $w_{Q,inst} \le \ell/300$ and $(w_{fin} w_{G,inst}) \le \ell/200$
- b) quasi-permanent structural design situation: $w_{fin} \le \ell/250$

Load-bearing capacity

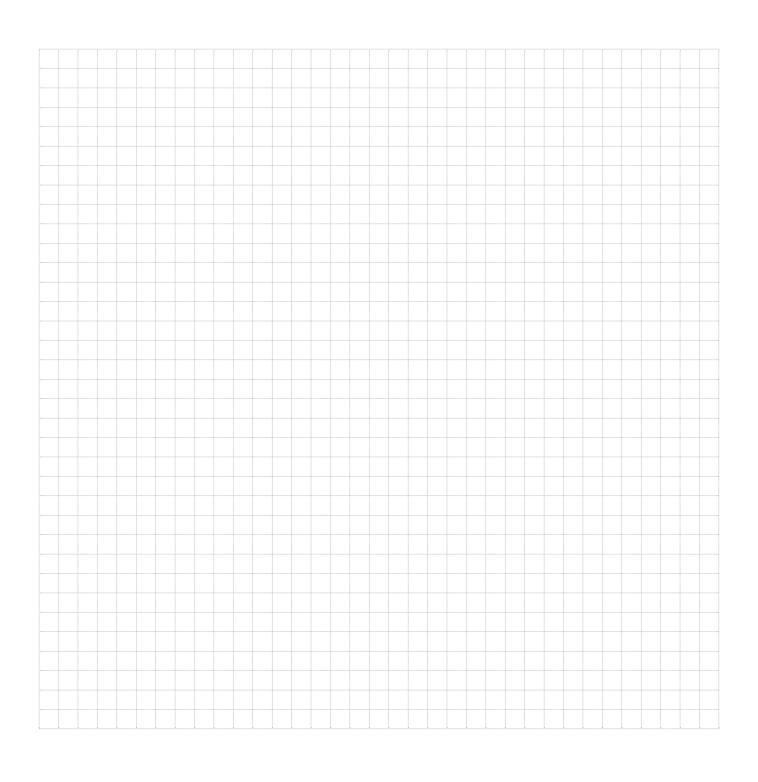
- a) Test of bending stress
- b) Test of shear stress

Structural fire design (one-sided burn-off)

- a) Charring rate β_0 = 0.67 mm/min if the burn-off only takes place in the covering layer or in the top double-layer
- b) Charring rate $\beta_0 = 0.76$ mm/min if several layers are affected (for the entire time of fire exposure)
- c) The minimum panel thicknesses (for R0) automatically reach fire resistance according to coloured marking



NOTES







KLH MASSIVHOLZ GMBH

A-8842 Katsch a. d. Mur 202 | Tel +43 (0)3588 8835 0 | Fax +43 (0)3588 8835 20 office@klh.at | www.klh.at

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