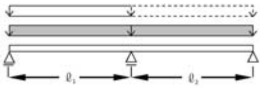
Structural analysis

TWO-SPAN BEAM - VIBRATION 04/2012



Two-span beam_Vibration

In accordance with approval Z 9.1-559
DIN 1052 (2008) and/or EN 1995-1-1 (2006)

Dead weight gk*)	Imposed load nk	Span of single-span beam								
		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	1,00	60 L3s	80 L3s	80 L3s	100 L3s	120 L3s	140 L5s	160 L5s – 2	180 L5s	220 L7s – 2
	2,00	80 L3s	90 L3s	90 L3s	120 L3s	120 L3s	160 L5s – 2		200 L5s	
	2,80		80 L3s			140 L5s		180 L5s	220 L7s – 2	
	3,50	80 L3s		100 L3s	120 L3s					240 L7s – 2
	4,00		90 L3s					200 L5s		
	5,00		100 L3s	120 L3s						
1,50	1,00	80 L3s	80 L3s	90 L3s	120 L3s	140 L5s	160 L5s – 2	180 L5s	220 L7s – 2	220 L7s – 2
	2,00	80 L3s						200 L5s		240 L7s – 2
	2,80			100 L3s	120 L3s					
	3,50			100 L3s						
	4,00		90 L3s	120 L3s		160 L5s – 2	180 L5s			
	5,00		100 L3s		140 L5s			220 L7s – 2		
2,00	1,00	80 L3s	80 L3s	100 L3s	120 L3s	140 L5s	160 L5s – 2	200 L5s	220 L7s – 2	240 L7s – 2
	2,00				120 L3s					
	2,80		80 L3s	120 L3s	140 L5s	160 L5s – 2	180 L5s	220 L7s – 2		
	3,50		90 L3s	120 L3s						
	4,00									
	5,00		100 L3s				200 L5s		240 L7s – 2	260 L7s – 2
2,50	1,00	80 L3s	80 L3s	120 L3s	140 L5s	160 L5s – 2	180 L5s	220 L7s – 2	220 L7s – 2	240 L7s – 2
	2,00		90 L3s	120 L3s						
	2,80		90 L3s				200 L5s		240 L7s – 2	260 L7s – 2
	3,50									
	4,00									
	5,00	80 L3s	100 L3s							
3,00	1,00	80 L3s	90 L3s	120 L3s	140 L5s	160 L5s – 2	200 L5s	220 L7s – 2	240 L7s – 2	240 L7s – 2
	2,00		90 L3s							260 L7s – 2
	2,80		100 L3s							
	3,50	80 L3s								
	4,00					180 L5s				280 L7s – 2
	5,00				160 L5s – 2		220 L7s – 2			

* The CLT self-weight is already taken into account in the table at ρ = 500 kg/m³!

Service class 1, imposed load category A (ψ_0 = 0.7; ψ_1 = 0.5; ψ_2 = 0.3)

Load-bearing capacity:
a) Verification of bending stresses
b) Verification of shearing stresses

kmod = 0.8

Serviceability:
a) Quasi-constant design situation
zul w fin = 250
b) Infrequent design situation:
zul w q,inst = 300
zul w fin - w g,inst = 200
c) Vibration
Vibration according to EN 1995-1-1 and Kreuzinger & Mohr
(f_1 > 8 Hz or f_1 > 5 Hz with a = 0.4m/s², v < v_{grenz}, w_{EF} < 1 mm)
D = 2%, 5 cm cement screed, b = 1.2 · ℓ

kdef = 0.6

Fire resistance
β = 0.65 mm/min

R0
R30
R60
R90

Since any vibration depends not only on the span but also on the mass, a thicker ceiling may be necessary despite a shorter span. The analysis was carried out using the imposed load on one field. In the event of imposed loads on both fields, the required ceiling thickness may be reduced.

This table specifies the required thicknesses for the normal design situation (R0). The colour shading represents the fire resistance time which is also attained with this thickness. If a higher fire resistance time is required, a separate analysis must be carried out.

This table is only for preliminary estimate purposes and is not a substitute for a structural analysis.

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