Structural analysis

SINGLE SPAN BEAM - VIBRATION 04/**2012**

Single-span beam_Vibration

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

Dead weight	Imposed load	Span of single-span beam								
gk*)	nk	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	80 L3s	80 L3s	90 L3s	120 L3s	120 L3s	140 L5s	160 L5s – 2	180 L5s	220 L7s – 2
	2,00		90 L3s	100 L3s		120 L3s			200 L5s	
	2,80					140 L5s	160 L5s – 2	180 L5s		
	3,50	80 L3s	90 L3s	120 L3s	120 L3s				220 L7s – 2	
	4,00		100 L3s		140 L5s			200 L5s		240 L7s – 2
	5,00	90 L3s	120 L3s	120 L3s		160 L5s – 2				
1,50	1,00	80 L3s	90 L3s	100 L3s	120 L3s	140 L5s	160 L5s – 2	180 L5s	200 L5s	220 L7s – 2
	2,00									
	2,80	80 L3s	100 L3s	120 L3s	120 L3s			200 L5s	220 L7s – 2	240 L7s – 2
	3,50				140 L5s					
	4,00	90 L3s		120 L3s		160 L5s – 2				
	5,00	90 L3s	120 L3s				180 L5s	220 L7s – 2		
2,00	1,00	80 L3s	100 L3s	120 L3s	120 L3s	140 L5s	160 L5s – 2	200 L5s	220 L7s – 2	240 L7s – 2
	2,00									
	2,80	90 L3s			140 L5s		180 L5s			
	3,50					160 L5s – 2		220 L7s – 2		
	4,00	90 L3s	120 L3s	120 L3s						
	5,00						200 L5s		240 L7s – 2	260 L7s – 2
2,50	1,00	90 L3s	100 L3s	120 L3s	140 L5s	160 L5s – 2	160 L5s – 2	200 L5s	220 L7s – 2	240 L7s – 2
	2,00						180 L5s			
	2,80		120 L3s	120 L3s				220 L7s – 2		
	3,50	90 L3s					200 L5s		240 L7s – 2	260 L7s – 2
	4,00			140 L5s						
	5,00	100 L3s	120 L3s		160 L5s – 2					
3,00	1,00	90 L3s	120 L3s	120 L3s	140 L5s	160 L5s – 2	180 L5s	220 L7s – 2	220 L7s – 2	240 L7s – 2
	2,00	90 L3s								
	2,80						200 L5s		240 L7s – 2	260 L7s – 2
	3,50	100 L3s		140 L5s	160 L5s – 2			220 L7s – 2		
	4,00		120 L3s							
	5,00					180 L5s				280 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 ($\psi_0 = 0.7$; $\psi_1 = 0.5$; $\psi_2 = 0.3$)

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 $a = 0.4 m/s^2$, $v < v_{grenz}$, $w_{EF} < 1$ mm)
D = 2%, 5 cm cement screed, $b = 1.2 \cdot \ell$

kdef = 0.6

Fire resistance
HFA 2011
v1 = 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.

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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