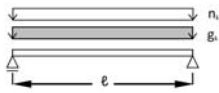


Structural analysis

SINGLE SPAN BEAM - VIBRATION

04/2012



Single-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		80 L3s	90 L3s		120 L3s	140 L5s	160 L5s – 2	180 L5s	
	2,00	80 L3s	90 L3s	100 L3s	120 L3s	120 L3s	140 L5s	160 L5s – 2	200 L5s	220 L7s – 2
	2,80							180 L5s		
	3,50	80 L3s	90 L3s	120 L3s	120 L3s	140 L5s	160 L5s – 2	200 L5s	220 L7s – 2	240 L7s – 2
	4,00		100 L3s		140 L5s					
1,50	5,00	90 L3s	120 L3s	120 L3s	160 L5s – 2					
	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		120 L3s	120 L3s	140 L5s	160 L5s – 2	200 L5s	220 L7s – 2	240 L7s – 2
	3,50		100 L3s							
2,00	4,00	90 L3s		120 L3s	140 L5s	160 L5s – 2	180 L5s	220 L7s – 2		
	5,00	90 L3s	120 L3s							
	1,00	80 L3s	100 L3s	120 L3s	120 L3s	140 L5s	160 L5s – 2	200 L5s		
	2,00									
	2,80	90 L3s			140 L5s		180 L5s		220 L7s – 2	240 L7s – 2
2,50	3,50		120 L3s					220 L7s – 2		
	4,00	90 L3s	120 L3s	120 L3s		160 L5s – 2	200 L5s		240 L7s – 2	260 L7s – 2
	5,00	100 L3s	120 L3s	140 L5s	160 L5s – 2					
	1,00	90 L3s	100 L3s	120 L3s		160 L5s – 2	180 L5s	200 L5s	220 L7s – 2	240 L7s – 2
	2,00		120 L3s		140 L5s					
3,00	2,80									
	3,50			140 L5s		160 L5s – 2	200 L5s	220 L7s – 2	240 L7s – 2	260 L7s – 2
	4,00	100 L3s	120 L3s		160 L5s – 2					
	5,00					180 L5s				
										280 L7s – 2

* The CLT self-weight is already taken into account in the table at $p = 500 \text{ kg/m}^3$!

Service class 1, imposed load category A ($\psi_0 = 0.7$; $\psi_1 = 0.5$; $\psi_2 = 0.3$)

Load-bearing capacity:

- Verification of bending stresses
- Verification of shearing stresses

$k_{mod} = 0.8$

Serviceability:

- Quasi-constant design situation
 $z_{ul} w_{fin} = 250$
- Infrequent design situation:
 $z_{ul} w_{q,inst} = 300$
 $z_{ul} w_{fin} - w_{g,inst} = 200$
- Vibration
Vibration according to EN 1995-1-1 and Kreuzinger & Mohr
($f_1 > 8 \text{ Hz}$ or $f_1 > 5 \text{ Hz}$ with $a = 0.4 \text{ m/s}^2$, $v < v_{grenz}$, $w_{EF} < 1 \text{ mm}$)
 $D = 2\%$, 5 cm cement screed, $b = 1.2 \cdot \ell$

$k_{def} = 0.6$

Fire resistance

HFA 2011
 $v1 = 0.65 \text{ mm/min}$

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.