

1. input data

1.1. general settings

vibration verification acc. to DIN EN 1995-1-1, 7.3

value acc. to DIN EN 1995-1-1, 7.3.3, figure 7.2: $a = 0.50 \text{ mm/kN} \Rightarrow b = 150.00$

modal damping ratio $\xi = 0.01000$

numerical solution by means of Fourier series expansion

1.2. dimensions

ceiling width $b = 5.000 \text{ m}$, 1 span(s), all outer edges are hinged

span	l m
1	4.600

1.3. permanent action effects

Nr.	action eff	g kN/m ²
1	permanent loads	2.825
Σ		2.825

1.4. screed

screed is not taken into account

1.5. cross laminated timber ceiling panel

Derix X-Lam X-150/5s, structure **30.0-30.0-30.0-30.0-30.0** solid coniferous timber C24

top layers in x-direction, $d = 150.0 \text{ mm}$

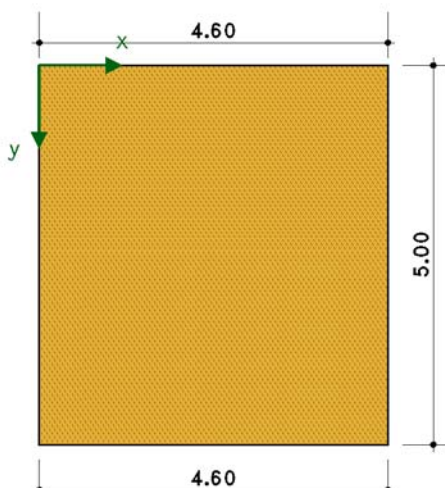
without consideration of shear deformations in x-direction

without consideration of shear deformations in y-direction

lateral contraction number $v = 0.00$, drill stiffness = 50.0

plate is clamped with 2- axis

1.6. plan view scale 1:100



2. results

2.1. natural frequency

$EI_{\text{lengthwise}} = 2.450250 \text{ MNm}^2/\text{m}$, $EI_{\text{cross}} = 0.643500 \text{ MNm}^2/\text{m}$, $m = 288.0 \text{ kG/m}^2$

$f_e = 8.026 \text{ Hz} \geq f_e = 8 \text{ Hz} \Rightarrow$ **criterion fulfilled!**

2.2. unit pulse velocity

$n_{40} = 3.3550$

$v = 1.415 \text{ mm/s} \leq v_{\text{grenz}} = 9.967 \text{ mm/s} \Rightarrow$ **criterion fulfilled!**

2.3. heel strike

$v = 29.752 \text{ mm/s} \leq v_{\text{grenz}} = 59.803 \text{ mm/s} \Rightarrow$ **criterion fulfilled!**

2.4. acceleration/resonance

$a = 0.927077 \text{ m/s}^2 > 0.3 \text{ m/s}^2 \Rightarrow$ noticeable, not disturbing

2.5. stiffness criterion

$x_{\max F} = 2.300 \text{ m}$, $x_{\max w} = 2.300 \text{ m} \Rightarrow w_{\max} = 0.251 \text{ mm}$

$w(1\text{kN}) = 0.25 \text{ mm} \leq w_{\text{grenz}} = 0.5 \text{ mm} \Rightarrow \text{criterion fulfilled!}$

2.6. unit pulse velocity

$n_{40} = 3.3550$

$v = 1.415 \text{ mm/s} \leq v_{\text{grenz}} = 9.967 \text{ mm/s} \Rightarrow \text{criterion fulfilled!}$

verification fulfilled!