

Task 3 - define P

$$T \leq 390 \text{ N/m}$$

mean diameter $\rightarrow d_m = 44 \text{ mm}$

$$\mu = 0,15$$

$$\gamma = 5,72^\circ$$

Friction factor $d = 50 \text{ mm}$

$$P = ?$$

$$T = \frac{\mu \cdot \bar{F}_A \approx d_m}{2 [\sin(0,5 \cdot \gamma) + \mu (\cos(0,5 \cdot \gamma))]}$$

$$P = \frac{2 \cdot T \cdot [\sin(0,5 \cdot \gamma) + \mu (\cos(0,5 \cdot \gamma))]}{\mu \cdot \frac{\pi d^2}{4} \cdot d_m}$$

$$P = \frac{2 \cdot 390 [\sin(0,5 \cdot 5,72^\circ) + 0,15 \cdot \cos(0,5 \cdot 5,72^\circ)]}{0,15 \cdot \frac{\pi \cdot 0,05^2}{4} \cdot 0,044}$$

$$P = 12 \cdot 10^6 \text{ Pa} = \underline{\underline{12 \text{ MPa}}}$$

Task 4 - Crimp connection

$$v_{re} = 0,08$$

crimp coeff. H7/g6

$$R_z \neq H$$

Structural steel - $E = 210 \text{ GPa}$

$$v = 0,3$$

$$R_{el} = 285 \text{ MPa}$$

Maximum pulsating force = ?

$$F_{Ax} = \frac{\pi \cdot D_F \cdot l \cdot v_{re} \cdot P}{s_r \rightarrow r_F}$$

max crimp $\varnothing 45 \text{ g6} = 45,059 \text{ mm}$ min crimp $\varnothing 45,025 \text{ mm}$

$\varnothing 45 \text{ H7} = 45,000 \text{ mm} / 45,025 \text{ mm}$

Difference in P_u and P_o
 $|P_u| = 0,059 \text{ mm} \rightarrow \text{maximum crimp}$

$|P_o| = 0,025 \text{ mm} \rightarrow \text{minimum crimp}$

$|P_{u, \min}| = 0,059 - 0,8(4+4) = 4,6 \mu\text{m} = 0,0046 \text{ mm}$
 can't get on the value 0,0226 mm

$$k = \frac{F_A}{E_e} \left(\frac{1 + Q_F^2}{1 - Q_F^2} - v \right) + \frac{1 + Q_A^2}{1 - Q_A^2} + v_A$$

$$Q_F = \frac{P_u}{D_F}$$

$$Q_A = \frac{D_F}{P_A}$$

$$k = \frac{210}{210} \left(\frac{1 + 0^2}{1 - 0^2} - 0,3 \right) + \left(\frac{1 + 0,5625^2}{1 - 0,5625^2} + 0,3 \right)$$

$$Q_F = \frac{0}{45} = 0$$

$$Q_A = \frac{45}{80} = 0,5625$$

$$F_A = \frac{2 \cdot 0,059 \cdot 0,026 \cdot 0,08 \cdot 12 \cdot 10^6}{1,5}$$

$$F_A = 3529 \text{ N}$$

ϵ_w ... relative effective crimp

$$\epsilon_w = \frac{|P_u|}{D_F} = k \cdot \frac{P}{E_A} \Rightarrow P = \frac{|P_u| \cdot E_A}{k \cdot D_F} = 18,5 \text{ MPa}$$

(2) $|P_{u, \max}| = 0,059 - 0,8(4+4) = 52,6 \mu\text{m}$

$$\underline{\underline{k = 2,926}}$$

$$\xi_w = \frac{|P_{w, \max}|}{D_F} \leq \frac{2 R_{ELA}}{\sqrt{3} \cdot S_{Pa} \cdot E} \Rightarrow S_{Pa} = \frac{2 R_{ELA} \cdot P_F}{\sqrt{3} \cdot E \cdot |P_{w, \max}|} = \frac{2 \cdot 285 \cdot 10^6 \cdot 0,045}{\sqrt{3} \cdot 210 \cdot 10^9 \cdot 0,0526 \cdot 10^{-3}}$$

$$\boxed{S_{Pa} = 1,34} \quad \checkmark$$

$$P_{\cdot} S_{Pl} = \frac{4}{\sqrt{3} \cdot (1 - \nu^2)} \cdot \frac{|P_{w, \max}|}{D_F} \cdot \frac{R_{ELI}}{E} = \frac{4 \cdot 285 \cdot 10^6}{\sqrt{3} \cdot (1 - 0^2) \cdot \frac{0,0526 \cdot 10^{-3}}{0,045} \cdot 210 \cdot 10^9}$$

$$\boxed{S_{Pl} = 2,68} \quad \checkmark$$