NV-2 a) $F_{Niet} = \tau_a \cdot \frac{\pi}{4} \cdot d_1^2 \cdot \cancel{m}^{1} \cdot \cancel{n}^{8}$

$\Rightarrow F_{Niet} = 60 \frac{N}{mm^2} \cdot \frac{\pi}{4} \cdot 8\,mm \cdot 8$

$\Rightarrow F_{Niet} = 3015{,}929\ N$

b) $\sigma_{zul} = 180 \frac{N}{mm^2} \overset{!}{\geq} \frac{F_{Niet}}{d_1 \cdot s_{min} \cdot \cancel{n}_1}$

$= 31{,}416 \frac{N}{mm^2}$ auf EINEN Niet. ✓

c) $n = 16{,}67 \frac{1}{s}$, $\omega = 2\pi n$, $M_t \cdot \omega = P$

$M_t = F_{Niet} \cdot \left(4 \cdot \frac{100}{2} + 4 \cdot \frac{125}{2}\right)$

$= 1357{,}168\ Nm$

$\Rightarrow P = M_t \cdot \omega = M_t \cdot 2\pi n = 142{,}15\ kW$

d) $\tau_{t\,zul} = \frac{M_t}{W_t} \Rightarrow \frac{\pi d^3}{16} = M_t / \tau_{t\,zul}$

$\Rightarrow d = \sqrt[3]{\frac{16 M_t}{\pi \cdot \tau_{t\,zul}}} = 41{,}039\ mm$

$\Rightarrow 38 \leq d \leq 44 \rightarrow b \times h = 12 \times 6$, $t_1 = 3{,}9\ mm$

$t_2 = 2{,}2\ mm$

Probe: $d_w + t_1 = 44{,}939\ mm \approx 45 > 44$

$\Rightarrow$ Passfeder $b \times h = 14 \times 6$

e) $d_w = 44{,}939\ mm$

$$\tau_{a\,zul} \overset{!}{\geq} \frac{F_u}{b \cdot l_1} \Leftrightarrow l_1 = \frac{F_u}{b \cdot \tau_{a\,zul}} = \frac{2\,M_t}{d_w \cdot b \cdot \tau_{a\,zul}}$$

$$\Rightarrow l_1 = \frac{2 \cdot 1357.168\ N \cdot mm}{44{,}939\ mm \cdot 14\ mm \cdot 150\ \frac{N}{mm^2}} = 28{,}762\ mm$$

$$l_{1\_w} = \frac{2\,M_t}{d_w\,(h - t_1) \cdot p_{zul}} = 79{,}474\ mm$$

richtig für den gewählten Durchmesser.

f) $\tau_{t\,zul} = \frac{M_t}{W_t}$, $d_A = 67$, $d_i = 44{,}939$

$$\Rightarrow \tau_{t\,zul} \overset{!}{\geq} \frac{M_t}{\frac{\pi}{16} \cdot \frac{d_A^4 - d_i^4}{d_A}} = 28{,}813\ \frac{N}{mm^2} \quad ✓$$

$$\tau_{t\,zul} = 70\ \frac{N}{mm^2}$$