Prüfung

Wienerberger
Building Material Solutions

1)

$d_0 = 2 \cdot 10^{-3}\,m$

$l_0 = 2\,m$

$\Delta l = 2 \cdot 10^{-4}\,m$

$E = 12{,}3 \cdot 10^{10}\,\frac{N}{m^2}$

$\mu = 0{,}34$

$\alpha = 16{,}8 \cdot 10^{-6}\,\frac{1}{K}$

a) $\varepsilon = \frac{\Delta l}{l_0} = \underline{10^{-4}}$

b) $\sigma_n = E \cdot \frac{\Delta l}{l_0} = \underline{1{,}23 \cdot 10^{7}\,\frac{N}{m^2}}$

c) $F_N = \sigma \cdot A \qquad A = r^2 \pi = (10^{-3}\,m)^2 \pi = \underline{1 \cdot 10^{-6}\,m^2}$

$\underline{F_N = 12{,}3\,N}$

d) $\Delta d = -\mu \cdot \varepsilon \cdot d_0 = \underline{-6{,}8 \cdot 10^{-8}\,m}$

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2) $\vartheta = 40\,°C$

a) $R(\vartheta)_{PT100} = 100\,\Omega \cdot (1 + 3{,}9083 \cdot 10^{-3}\,\frac{1}{°C} \cdot 40\,°C - 0{,}5775 \cdot 10^{-6}\,\frac{1}{°C^2} \cdot 40^2\,°C^2)$

$= \underline{115{,}5410\,\Omega}$

b) $R(\vartheta)_{NL} = R_N\, e^{B\left(\frac{1}{T} - \frac{1}{T_N}\right)} = 1\,\Omega \cdot e^{5000\,K\left(\frac{1}{313{,}15\,K} - \frac{1}{298{,}15\,K}\right)}$ $\qquad T = 40 + 273{,}15\,K$

$= \underline{0{,}4479\,\Omega}$ $\qquad \underline{313{,}15\,K}$

c) $E_{PT100} = R(\vartheta)\,\frac{d}{d\vartheta}$

$= 100\,\Omega\,(A + 2B\vartheta) = 0{,}3821\,\frac{\Omega}{°C}$

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d) $t_{0,5} = 8\,s$

$t_{0,9} = ?$

$+0,5 = +e^{-\frac{8s}{\tau}}$

$-\frac{8s}{\tau} = \ln(0,5)$

$\tau = -8s \cdot \frac{1}{\ln|0,5|} = \underline{11,542\,s}$

$0,9 = 1 - e^{-\frac{t_{0,9}}{11,542s}}$

$\ln(0,1) = -\frac{t_{0,9}}{11,542s}$

$\underline{t_{0,9} = 26,576\,s}$

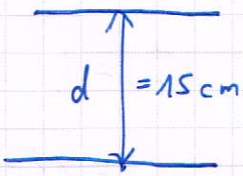
3) $\varepsilon_r = 42,5 \quad f_m = 10\,GHz \quad d = 20\,m$

a) $\lambda = \frac{c}{f} = \frac{343\ m/s}{10 \cdot 10^9\ 1/s} = \underline{3,43 \cdot 10^{-8}\,m}$

b) $t = \frac{s}{v} = \frac{20\,m}{343\,\frac{m}{s}} = \underline{0,05831\,s}$

c)

4) $\rho = 1 \frac{kg}{l}$ $v = 2 \frac{m}{s}$ $d = 15 \cdot 10^{-2}\,m$



a) $\dot{m} = v_m \cdot \rho \cdot A = v_M \cdot \rho \cdot \pi \frac{d^2}{4} = 35{,}34 \frac{kg}{s}$

b) $U_E = \frac{\dot{m}}{\rho} \cdot \frac{4B}{\pi D} = 8{,}999 \cdot 10^{-5}\,V$

c) $t_{1/2} = \frac{d}{\sin 45° \over c \pm v \cdot \cos 45°}$ $t_1 = 1{,}432 \cdot 10^{-4}\,s$

$t_2 = 1{,}4347 \cdot 10^{-4}\,s$

$\Delta t = 2{,}7 \cdot 10^{-7}\,s$

5) a) $\beta = \frac{B}{G}$ $\frac{12\,mm}{2{,}4\,mm} = 5$

b) $g = f \cdot \frac{\beta + 1}{\beta} = 30\,mm$

$b = f \cdot \frac{g}{g - f} = 150\,mm$

6) $B_z = 0{,}1\,T$ $I_x = 7 \cdot 10^{-3}\,A$ $U_H = 155 \cdot 10^{-3}\,V$

a) d für $A_H = 8{,}917 \cdot 10^{-5} \frac{m^3}{As}$

$d = \frac{U_H}{A_H \cdot I_x \cdot B_z} = 2{,}45 \cdot 10 = \frac{155 \cdot 10^{-3}\,V}{8{,}917 \cdot 10^{-5} \frac{m^3}{As} \cdot 7 \cdot 10^{-3}\,A \cdot 0{,}1\,T}$

$\Rightarrow d = 4{,}03 \cdot 10^{-7}\,m$

b) $R_H = A_H \cdot \frac{B}{d} = 22{,}143\,\Omega$

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7) $E_N = 2\,lx \quad d = 3\,m$

a) $E_n = \frac{I_n}{d^2}$

$I_n = 2\,lx \cdot 3^2\,m^2$

$= 18\,cd$

b) $\Phi_N = I_N \cdot \Omega$?

$\Omega = \frac{A}{d^2} = \frac{4\pi d^2}{d^2}$

$= 18\,cd \cdot 4\pi \cdot 3\,m$

$= 226{,}19\,lm$