2.1 Cu

$l = 100\,m$

$A = 1{,}5\,mm^2$

$$R = \frac{l \cdot \rho}{A} = \frac{100 \cdot 0{,}0178}{1{,}5} = 1{,}187\,\Omega$$

$$R = \frac{l}{\mu \cdot A} = \frac{100}{56 \cdot 1{,}5} = 1{,}19\,\Omega$$

2.2 $\rho = 1{,}04\,\frac{\Omega\,mm^2}{m}$

$S = 20\,A/mm^2$

$b = 2{,}5\,mm \qquad h = 0{,}2\,mm$

$l = 18\,m$

$$A = b \cdot h = 2{,}5 \cdot 0{,}2 = 0{,}5\ mm^2$$

$$R = \frac{l \cdot \rho}{A} = \frac{18 \cdot 1{,}04}{0{,}5} =$$

$$= 37{,}4\ \Omega$$

$$S = \frac{I}{A} \Rightarrow I = S \cdot A$$

$$= 20 \cdot 0{,}5$$

$$= 10\ A$$

2.3 $R = 10\ \Omega$

$$\rho = 1{,}1\ \frac{\Omega\ mm^2}{m}$$

$$d = 1{,}6\ mm$$

$$A = \frac{d^2 \pi}{4} = \frac{1{,}6^2 \cdot \pi}{4} =$$

$$= 2{,}01\ mm^2$$

$$R = \frac{l \cdot \rho}{A} \Rightarrow l = \frac{R \cdot A}{\rho} =$$

$$l = \frac{10 \cdot 2{,}01}{1{,}1} = 18{,}28\ m$$

2.4 $A = 25\,mm^2$

$l = 3{,}6\,km$ Al

$$R = \frac{l}{\rho \cdot A} = \frac{3600}{36 \cdot 25} =$$

$$= 4\,\Omega$$

2.5 $d = 0{,}4\,mm$

$l = 2\,m$

$R = 6{,}7\,\Omega$

$$A = \frac{d^2 \cdot \pi}{4} = \frac{0{,}4^2 \cdot \pi}{4} = 0{,}126\,mm^2$$

$$R = \frac{l \cdot \rho}{A} \quad | \cdot A$$

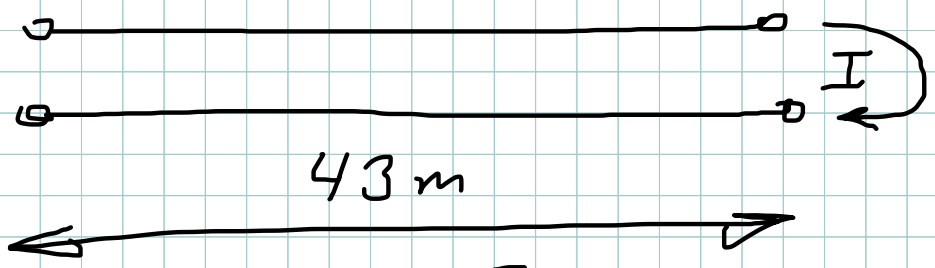
$$R \cdot A = l \cdot \rho \quad | : l$$

$$\frac{R \cdot A}{l} = \rho$$

$$\rho = \frac{R \cdot A}{l} = \frac{6{,}7 \cdot 0{,}126}{2} = 0{,}422\,\frac{\Omega\,mm^2}{m}$$

2.6 $\ell = 43\,m$

$U_L = 3{,}3\,V \qquad I = 16\,A$



$$R = \frac{U}{I} = \frac{3{,}3}{16} = 0{,}206\,\Omega$$

$$R = \frac{\ell}{\gamma \cdot A}$$

$$A = \frac{\ell}{\gamma \cdot R} =$$

$$= \frac{86}{56 \cdot 0{,}206} = 7{,}45\,mm^2$$

$$\Rightarrow 3 \times 10\,mm^2$$

2.7

$$A = \frac{d^2 \cdot \pi}{4} = \frac{0,6^2 \cdot \pi}{4}$$

$$= 0,283 \text{ mm}^2$$

$$N = \frac{b}{d} = \frac{80}{0,6} = 133,3$$

$$\Rightarrow 133 \text{ Windungen}$$

$$d_m = d_1 + d = 32 + 0,6$$

$$= 32,6 \text{ mm}$$

$$l = N \cdot d_m \cdot \pi$$

$$= 133 \cdot 32,6 \cdot \pi =$$

$$= 13\,621 \text{ mm}$$

$$= 13,6 \text{ m}$$

$$R = \frac{l}{\gamma \cdot A} = \frac{13,6}{56 \cdot 0,283} =$$

$$= 0,858 \, \Omega$$

2. g $R = 133\,\Omega$ $d = 0{,}2\,mm$

$$\rho = 0{,}43\ \frac{\Omega\,mm^2}{m}$$

$$A = \frac{d^2 \cdot \pi}{4} = \frac{0{,}2^2 \cdot \pi}{4} =$$

$$= 0{,}0314\ mm^2$$

$$R = \frac{l \cdot \rho}{A} \quad | \cdot A$$

$$R \cdot A = l \cdot \rho \quad | : \rho$$

$$\frac{R \cdot A}{\rho} = l$$

$$l = \frac{133 \cdot 0{,}0314}{0{,}43} =$$

$$= 9{,}72\ m$$

2.9 Al $d = 2\,mm$ 14 Stk

Fe $d = 2{,}4\,mm$ 7 Stk

$$A_{Al} = 14 \cdot \frac{d^2 \cdot \pi}{4} =$$

$$= 14 \cdot \frac{2^2 \cdot \pi}{4} =$$

$$= 43{,}98\ mm^2$$

$$A_{Fe} = 7 \cdot \frac{d^2 \cdot \pi}{4} =$$

$$= 7 \cdot \frac{2{,}4^2 \cdot \pi}{4} = 31{,}66\ mm^2$$

$$R_{Al} = \frac{l}{\gamma \cdot A} = \frac{1000}{36 \cdot 43{,}98} =$$

$$= 0{,}63\ \Omega$$

$$R_{Fe} = \frac{l}{\gamma \cdot A} = \frac{1000}{\gamma \cdot 31{,}66} =$$

$$= 3{,}95\ \Omega$$

$$A_{Al} = 43,98\ mm^2$$
$$= 0,4398\ cm^2$$
$$= 0,004398\ dm^2$$

$$l = 1000\ m = 10.000\ dm$$

$$V_{Al} = l \cdot A = 10.000 \cdot 0,004398 =$$
$$= 43,98\ dm^3$$

$$m_{Al} = V_{Al} \cdot \rho_{Al} =$$
$$= 43,98 \cdot 2,7 = 118,7\ kg$$

2.11 $d = 0,4\,mm$

$S = 25\,\frac{A}{mm^2}$

$$A = \frac{d^2 \pi}{4} = \frac{0,4^2 \cdot \pi}{4}$$

$$= 0,125\,mm^2$$

$$S = \frac{I}{A} \Rightarrow I = S \cdot A$$

$$I = 25 \cdot 0,125 = 3,1\,A$$