

Nº 10. 1. 1. 1

$$R = \frac{U}{I} = \frac{0,3}{15,5} = 0,0193 \Omega$$

a) $R = \frac{\varphi \cdot l}{A} \Rightarrow A = \frac{\varphi \cdot l}{R} = \frac{0,0175 \cdot 2,4}{0,01935} = 2,17 \text{ mm}^2$

b) A normalisée $\Rightarrow \underline{2,5 \text{ mm}^2}$

Nº 10. 1. 1. 2

$$U_{ch} = \frac{U \cdot 4}{100} = \frac{36 \cdot 4}{100} = 1,44 V$$

$$Rl = \frac{U_{ch}}{I} = \frac{1,44}{15} = 0,096 \Omega$$

$$A = \frac{\varphi \cdot l \cdot z}{R} = \frac{0,0175 \cdot 144 \cdot 2}{0,096} = \underline{5,25 \text{ mm}^2}$$

A normalisée $\Rightarrow \underline{6 \text{ mm}^2}$

Nº 10. 1. 1. 3

$$U_{ch} = U_1 - U_2 = 36 - 24 = 12 V$$

$$I = \frac{U}{R} = \frac{24}{120} = 0,2 A$$

$$Rl = \frac{U_{ch}}{I} = \frac{12}{0,2} = 60 \Omega$$

$$Rl = \frac{\varphi \cdot l}{A} \Rightarrow A = \frac{\varphi \cdot l}{R} = \frac{0,0175 \cdot 755}{60} = 0,22 \text{ mm}^2$$

$$A = \phi^2 \cdot 0,785 \Rightarrow \phi = \sqrt{\frac{A}{0,785}} = \sqrt{\frac{0,22}{0,785}} = 0,529 \text{ mm}$$

ϕ normalisé $\Rightarrow \underline{0,6 \text{ mm}}$

Nº 10. 1. 1. 4

$$U_{ch} = 220 \cdot 2\% = 4,4 V$$

$$I = \frac{P}{U} = \frac{5000}{220} = \underline{22,72 A} \Rightarrow c) I \text{ consigne } \underline{25 A} \text{ ou } \underline{63 A!}$$

$$Rl = \frac{U_{ch}}{I} = \frac{4,4}{22,72} = 0,1936 \Omega$$

a) $R = \frac{\varphi \cdot l \cdot z}{A} \Rightarrow A = \frac{\varphi \cdot l \cdot z}{R} = \frac{0,0175 \cdot 80 \cdot 2}{0,1936} = \underline{14,46 \text{ mm}^2}$

b) Section normalisée $\Rightarrow \underline{16 \text{ mm}^2}$

Nº 10.1.5

$$U_{ch} = U \cdot 2,8\% = 110 \cdot 2,8\% = 3,08 V$$

$$Rl = \frac{U_{ch}}{I} = \frac{3,08}{0,005} = 616 \Omega$$

$$a) R = \frac{\varphi \cdot l \cdot \lambda}{A} \Rightarrow A = \frac{\varphi \cdot l \cdot \lambda}{R} = \frac{0,0175 \cdot 12600 \cdot 2}{616} = \underline{0,7159 \text{ mm}^2}$$

$$A = \phi^2 \cdot 0,715 \Rightarrow \phi = \sqrt{\frac{A}{0,715}} = \sqrt{\frac{0,7159}{0,715}} = 0,95 \text{ mm}$$

$$b) \phi \text{ normalisé} \Rightarrow \underline{1 \text{ mm}^2}$$

Nº 10.1.6

$$U_{ch} = U \cdot 4\% = 220 \cdot 4\% = 8,8 V$$

$$Rl = \frac{U_{ch}}{I} = \frac{8,8}{68} = 0,1294 \Omega$$

$$Rl = \frac{\varphi \cdot l \cdot \lambda}{A} \Rightarrow A = \frac{\varphi \cdot l \cdot \lambda}{R} = \frac{0,0175 \cdot 90 \cdot 2}{0,1294} = \underline{22,18 \text{ mm}^2}$$

$$I \text{ thermique} = 68 A \Rightarrow A \text{ normalisée PIE} = \underline{25 \text{ mm}^2}$$

N° 10. 1. 2. 1

$$Rl = \frac{U_{ch}}{I} = \frac{4,5}{10} = 0,45 \Omega$$

$$a) Rl = \frac{P \cdot l \cdot z}{A} \Rightarrow A = \frac{P \cdot l \cdot z}{R} = \frac{0,0175 \cdot 80 \cdot 2}{0,45} = \underline{6,22 \text{ mm}^2}$$

$$b) A \text{ normalisée } PIE = \underline{10 \text{ mm}^2}$$

N° 10. 1. 2. 2

$$P_{\text{totale}} = P \cdot 3 = 1,2 \cdot 3 = 3,6 \text{ kW}$$

$$U_{ch} = U + 5\% = 220 \cdot 5\% = 11V \Rightarrow U = 220 - 11 = 209V$$

$$R = \frac{U^2}{P} = \frac{209^2}{3600} = 13,44 \Omega$$

$$I = \frac{U}{R} = \frac{209}{13,44} = 15,55 A$$

$$Rl = \frac{U_{ch}}{I} = \frac{11}{15,55} = 0,707 \Omega$$

$$a) Rl = \frac{P \cdot l \cdot z}{A} \Rightarrow A = \frac{P \cdot l \cdot z}{R} = \frac{0,0175 \cdot 120 \cdot 2}{0,707} = \underline{5,94 \text{ mm}^2}$$

$$b) \underline{\text{Non}} \Rightarrow 6 \text{ mm}^2$$

N° 10. 1. 2. 3

$$U_{ch \max} = U + 6\% = 380 \cdot 6\% = 22,8V$$

$$U_2 = U_1 - U_{ch} = 380 - 22,8 = 357,2V$$

$$R = \frac{U^2}{P} = \frac{380^2}{2400} = 60,16 \Omega$$

$$I = \frac{U}{R} = \frac{357,2}{60,16} = 5,936 A$$

$$Rl = \frac{U_{ch}}{I} = \frac{22,8}{5,936} = 3,84 \Omega$$

$$a) Rl = \frac{P \cdot l \cdot z}{A} \Rightarrow A = \frac{P \cdot l \cdot z}{R} = \frac{0,0175 \cdot 95 \cdot 2}{3,84} = \underline{0,865 \text{ mm}^2}$$

$$b) A \text{ selon PIE} \Rightarrow \text{min. } \underline{1,5 \text{ mm}^2}$$

$$c) I \text{ de consigne} \Rightarrow \underline{10 A}$$

Nº 10. 1.2.4

$$U_{ch} = U \cdot 2\% = 220 \cdot 2\% = 4,4 \text{ V}$$

$$Rl = \frac{U_{ch}}{I} = \frac{4,4}{10} = 0,44 \Omega$$

$$Rl = \frac{\varrho \cdot l \cdot A}{A} \Rightarrow l = \frac{R \cdot A}{\varrho \cdot A} = \frac{0,44 \cdot 1,5}{0,0175 \cdot 2} = \underline{\underline{18,86 \text{ m}}}$$

Nº 10.1.2.5

$$U_{ch} = U \cdot 1,8\% = 220 \cdot 1,8\% = 3,96 \text{ V}$$

$$U_{zw} = U_1 - U_{ch} = 220 - 3,96 = 216,04 \text{ V}$$

$$R = \frac{U^2}{P} = \frac{220^2}{2000} = 24,2 \Omega$$

c) $I = \frac{U}{R} = \frac{216,04}{24,2} = \underline{\underline{8,927 \text{ A}}} \Rightarrow \underline{\underline{10 \text{ A}}}$

$$Rl = \frac{U_{ch}}{I} = \frac{3,96}{8,927} = 0,443 \Omega$$

a) $Rl = \frac{\varrho \cdot l \cdot A}{A} \Rightarrow A = \frac{\varrho \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 114 \cdot 2}{0,443} = \underline{\underline{8,99 \text{ mm}^2}}$

b) $A \text{ normalisé} \Rightarrow \underline{\underline{10 \text{ mm}^2}}$

d) $A \text{ selon IN} \Rightarrow \underline{\underline{1,5 \text{ mm}^2}}$

e) $\underline{\underline{10 \text{ mm}^2}}$

Nº 10.1.2.6

$$P_{totale} = P \cdot 3 = 40 \cdot 3 = 120 \text{ W}$$

a) Pour 12V:

$$U_{ch} = U \cdot 3\% = 12 \cdot 3\% = 0,36 \text{ V}$$

$$U_{zw} = U_1 - U_{ch} = 12 - 0,36 = 11,64 \text{ V}$$

$$R_{lpe} = \frac{U^2}{P} = \frac{12^2}{120} = 1,2 \Omega$$

$$I = \frac{U}{R} = \frac{11,64}{1,2} = 9,7 \text{ A}$$

$$Rl = \frac{U_{ch}}{I} = \frac{0,36}{9,7} = 0,037 \Omega$$

$$Rl = \frac{\varrho \cdot l \cdot A}{A} \Rightarrow A = \frac{\varrho \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 42 \cdot 2}{0,037} = \underline{\underline{39,72 \text{ mm}^2}} \Rightarrow \underline{\underline{50 \text{ mm}^2}}$$

N° 10, 1, 2, 6 Suiteb) Pour 24 V

$$U_{ch} = U \cdot 3\% = 24 \cdot 3\% = 0,72 V$$

$$U_2 = U_1 - U_{ch} = 24 - 0,72 = 23,28 V$$

$$R_{lpe} = \frac{U^2}{P} = \frac{24^2}{120} = 4,8 \Omega$$

$$I = \frac{U}{R} = \frac{23,28}{4,8} = 4,85 A$$

$$R_l = \frac{U_{ch}}{I} = \frac{0,72}{4,85} = 0,1485 \Omega$$

$$A = \frac{\varrho \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 42 \cdot 2}{0,1485} = \underline{9,898 \text{ mm}^2} \Rightarrow \underline{10 \text{ mm}^2}$$

c) Pour 36 V

$$U_{ch} = U \cdot 3\% = 36 \cdot 3\% = 1,08 V$$

$$U_2 = U_1 - U_{ch} = 36 - 1,08 = 34,92 V$$

$$R_{lpe} = \frac{U^2}{P} = \frac{36^2}{120} = 10,8 \Omega$$

$$I = \frac{U}{R} = \frac{34,92}{10,8} = 3,233 A$$

$$R_l = \frac{U_{ch}}{I} = \frac{1,08}{3,233} = \underline{0,334 \Omega}$$

$$A = \frac{\varrho \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 42 \cdot 2}{0,334} = \underline{4,4 \text{ mm}^2} \Rightarrow \underline{6 \text{ mm}^2}$$

d) Pour 48 V

$$U_{ch} = U \cdot 3\% = 48 \cdot 3\% = 1,44 V$$

$$U_2 = U_1 - U_{ch} = 48 - 1,44 = 46,56 V$$

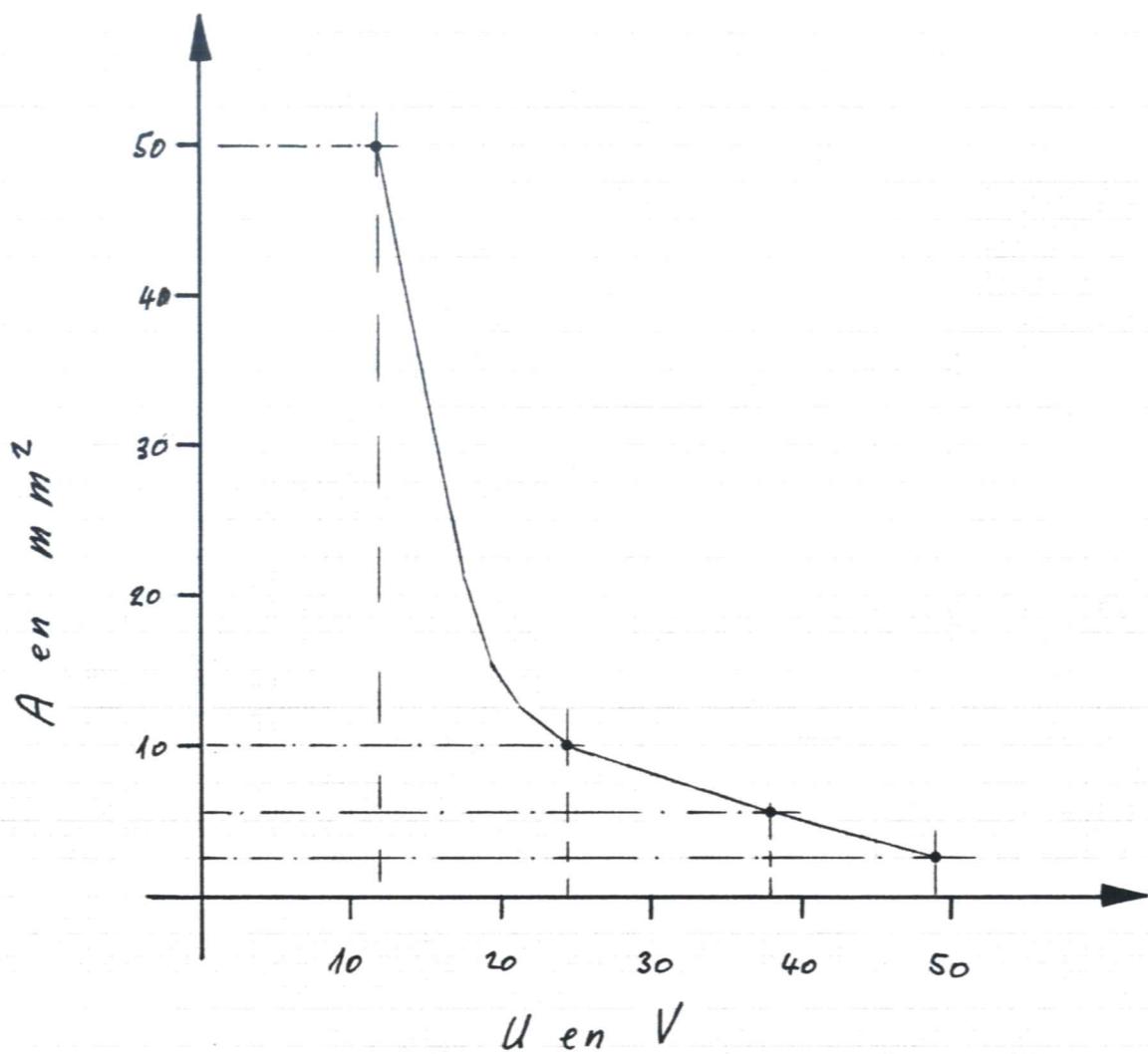
$$R_{lpe} = \frac{U^2}{P} = \frac{48^2}{120} = 19,2 \Omega$$

$$I = \frac{U}{R} = \frac{46,56}{19,2} = 2,425 A$$

$$R_l = \frac{U_{ch}}{I} = \frac{1,44}{2,425} = 0,593 A$$

$$A = \frac{\varrho \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 42 \cdot 2}{0,593} = \underline{2,475 \text{ mm}^2} \Rightarrow \underline{2,5 \text{ mm}^2}$$

Nº 10.1.2.6 Suite



Nº 10.1.2.7

$$P_{\text{totale}} = P \cdot n = 25 \cdot 15 = 375 \text{ W}$$

$$R = \frac{U^2}{P} = \frac{36^2}{375} = 3,456 \Omega$$

$$U_2 = U_1 - 6\% = 36 - 6\% = 33,84 \text{ V}$$

$$I = \frac{U}{R} = \frac{33,84}{3,456} = 9,79 \text{ A}$$

$$U_{ch} = U \cdot 6\% = 36 \cdot 6\% = 2,16 \text{ V}$$

$$R_l = \frac{U_{ch}}{I} = \frac{2,16}{9,79} = 0,22 \Omega$$

$$\text{a)} R_l = \frac{\varrho \cdot l \cdot \varnothing}{A} \Rightarrow A = \frac{\varrho \cdot l \cdot \varnothing}{R} = \frac{0,0175 \cdot 60 \cdot 2}{0,22} = \underline{\underline{9,545 \text{ mm}^2}} \Rightarrow \underline{\underline{10 \text{ mm}^2}}$$

$$\text{b)} U_2 = U - 6\% = 220 - 6\% = 206,8 \text{ V}$$

$$U_2 = \frac{36 \cdot 206,8}{220} = 33,84 \text{ V}$$

Nº 10. 1.2.7 Suite

$$P = \frac{U^2}{R} = \frac{33,84^2}{3,456} = 331,35 \text{ W}$$

$$I = \frac{P}{U} = \frac{331,35}{206,8} = 1,6 \text{ A}$$

$$U_{ch} = U \cdot 6\% = 220 \cdot 6\% = 13,2 \text{ V}$$

$$Rl = \frac{U_{ch}}{I} = \frac{13,2}{1,6} = 8,25 \Omega$$

$$A = \frac{g \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 60 \cdot 2}{8,25} = \underline{\underline{0,254 \text{ mm}^2}}$$

Nº 10. 1.2.8

$$U_{ch} = U \cdot 2\% = 220 \cdot 2\% = 4,4 \text{ V}$$

$$U_2 = U_1 - U_{ch} = 220 - 4,4 = 215,6 \text{ V}$$

$$I = \frac{S}{U} = \frac{600}{215,6} = 2,783 \text{ A}$$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{4,4}{2,783 \cdot 0,78} = 2,02 \Omega$$

a) $A = \frac{g \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 128 \cdot 2}{2,02} = \underline{\underline{221,1 \text{ mm}^2}}$

b) $A \Rightarrow \underline{\underline{25 \text{ mm}^2}}$

c) $A \Rightarrow \underline{\underline{1 \text{ mm}^2}}$

Nº 10. 1.2.9

$$U_{ch} = 220 \cdot 4\% = 8,8 \text{ V}$$

$$U_2 = U_1 - U_{ch} = 220 - 8,8 = 211,2 \text{ V}$$

c) $P = U \cdot I \cdot \cos \varphi \cdot n \Rightarrow I = \frac{P}{U \cdot \cos \varphi \cdot n} = \frac{1100}{211,2 \cdot 0,9 \cdot 0,75} = \underline{\underline{7,716 \text{ A}}}$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{8,8}{7,716 \cdot 0,9} = 1,267 \Omega$$

a) $A = \frac{g \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 37 \cdot 2}{1,267} = \underline{\underline{1,020 \text{ mm}^2}}$

b) $A \text{ normalisée} \Rightarrow \underline{\underline{1,5 \text{ mm}^2}}$

Nº 10.1.2.10

$$a) A = \frac{\varrho \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 74 \cdot 2}{1,267} = \underline{\underline{2,044 \text{ mm}^2}}$$

$$b) A \text{ normalisé} \Rightarrow \underline{\underline{2,5 \text{ mm}^2}}$$

Nº 10.1.2.11

$$U_{ch} = U \cdot 5\% = 220 \cdot 5\% = 11V$$

$$a) I = \frac{P}{U \cdot \cos \varphi} = \frac{2200}{220 \cdot 1} = 10A$$

$$a) Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{11}{10 \cdot 1} = \underline{\underline{1,1 \Omega}}$$

$$b) I = \frac{P}{U \cdot \cos \varphi} = \frac{2200}{220 \cdot 0,9} = 11,11A$$

$$b) Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{11}{11,11 \cdot 0,9} = \underline{\underline{1,1 \Omega}}$$

$$c) I = \frac{P}{U \cdot \cos \varphi} = \frac{2200}{220 \cdot 0,9} = 12,5A$$

$$c) Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{11}{12,5 \cdot 0,9} = \underline{\underline{1,1 \Omega}}$$

$$d) I = \frac{P}{U \cdot \cos \varphi} = \frac{2200}{220 \cdot 0,7} = 14,29A$$

$$d) Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{11}{14,29 \cdot 0,7} = \underline{\underline{1,1 \Omega}}$$

$$e) I = \frac{P}{U \cdot \cos \varphi} = \frac{2200}{220 \cdot 0,6} = 16,67A$$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{11}{16,67 \cdot 0,6} = \underline{\underline{1,1 \Omega}}$$

$$A \text{ a, b, c, d, e} = \frac{\varrho \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 100 \cdot 2}{1,1} = \underline{\underline{3,182 \text{ mm}^2}}$$

Nº 10.1.2.12

$$U_{ch} = U \cdot 4\% = 220 \cdot 4\% = 8,8V$$

$$I = \frac{S}{U} = \frac{5000}{220} = 22,73A$$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{8,8}{22,73 \cdot 1} = 0,387 \Omega$$

Nº 10. 1. 2. 12 Suite

$$a) A = \frac{P \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 100 \cdot 2}{0,387} = \underline{\underline{9,04 \text{ mm}^2}}$$

$$Rl = \frac{Uch}{I \cdot \cos \varphi} = \frac{8,8}{22,73 \cdot 0,9} = 0,43 \Omega$$

$$b) A = \frac{P \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 100 \cdot 2}{0,43} = \underline{\underline{8,13 \text{ mm}^2}}$$

$$Rl = \frac{Uch}{I \cdot \cos \varphi} = \frac{8,8}{22,73 \cdot 0,8} = 0,484 \Omega$$

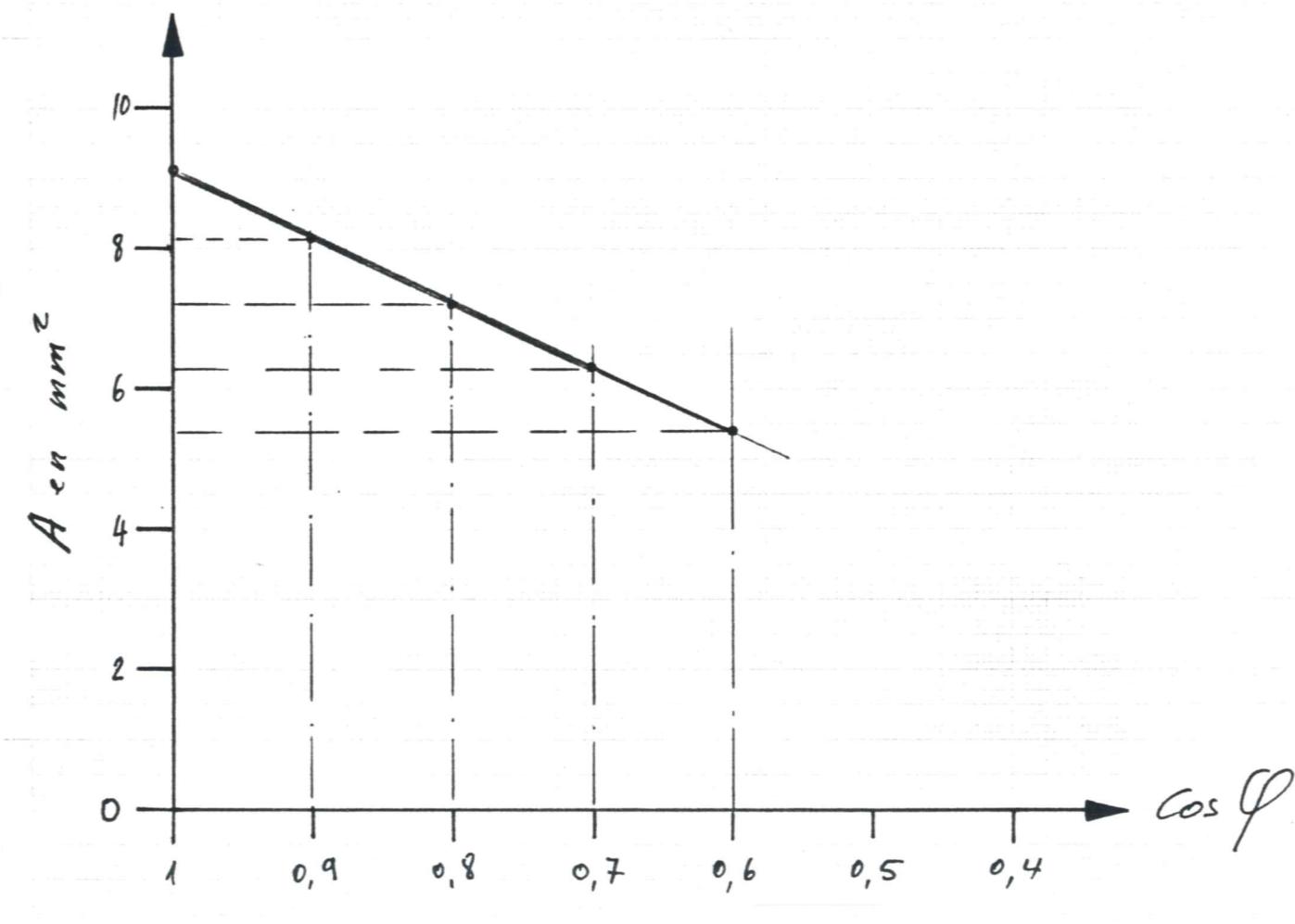
$$c) A = \frac{P \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 100 \cdot 2}{0,484} = \underline{\underline{7,23 \text{ mm}^2}}$$

$$Rl = \frac{Uch}{I \cdot \cos \varphi} = \frac{8,8}{22,73 \cdot 0,7} = 0,553 \Omega$$

$$d) A = \frac{P \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 100 \cdot 2}{0,553} = \underline{\underline{6,33 \text{ mm}^2}}$$

$$Rl = \frac{Uch}{I \cdot \cos \varphi} = \frac{8,8}{22,73 \cdot 0,6} = 0,645 \Omega$$

$$e) A = \frac{P \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 100 \cdot 2}{0,645} = \underline{\underline{5,42 \text{ mm}^2}}$$



Nº 10. 1. 2. 13

$$U_{ch} = U \cdot 3\% = 220 \cdot 3\% = 6,6 \text{ V} \Rightarrow U_2 = 213,4 \text{ V}$$

$$P = U \cdot I \cdot \cos \varphi \cdot n \Rightarrow I = \frac{P}{U \cdot \cos \varphi \cdot n} = \frac{1500}{220 \cdot 0,78 \cdot 0,75} = 11,65 \text{ A}$$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{6,6}{11,65 \cdot 0,78} = 0,726 \Omega$$

$$R = \frac{\rho \cdot l \cdot 2}{A} \Rightarrow l = \frac{R \cdot A}{\rho \cdot 2} = \frac{0,726 \cdot 1}{0,0175 \cdot 2} = \underline{\underline{20,75 \text{ m}}}$$

Nº 10. 1. 2. 14

$$P_{\text{totale}} = P + P \cdot n = 268 + 118 \cdot 12 = 4632 \text{ W}$$

$$U_{ch} = U \cdot 4\% = 220 \cdot 4\% = 8,8 \text{ V}$$

$$P = U \cdot I \cdot \cos \varphi \Rightarrow I_1 = \frac{P}{U \cdot \cos \varphi} = \frac{4632}{220 \cdot 0,96} = 45,77 \text{ A}$$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{8,8}{45,77 \cdot 0,96} = 0,4180 \Omega$$

a) $R = \frac{\rho \cdot l \cdot 2}{A} \Rightarrow A = \frac{\rho \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 235 \cdot 2}{0,4180} = \underline{\underline{19,68 \text{ mm}^2} \Rightarrow 25 \text{ mm}^2}$

$$I_2 = \frac{P}{U \cdot \cos \varphi} = \frac{4632}{220 \cdot 0,95} = 23,08 \text{ A}$$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{8,8}{23,08 \cdot 0,95} = 0,418 \Omega$$

b) $A = \frac{\rho \cdot l \cdot 2}{R} = \frac{0,0175 \cdot 235 \cdot 2}{0,418} = \underline{\underline{19,68} \Rightarrow 25 \text{ mm}^2}$

Nº 10. 1. 3. 1

$$U_{ch} = U \cdot 0,5\% = 380 \cdot 0,5\% = 1,9V$$

$$R = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{1,9}{60 \cdot 1} = 0,03166 \Omega$$

$$Rl = \frac{\varrho \cdot l \cdot \sqrt{3}}{A} \Rightarrow A = \frac{\varrho \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 28 \cdot 1,73}{0,03166} = \underline{86,8 \text{ mm}^2 \Rightarrow 35 \text{ mm}^2}$$

Nº 10. 1. 3. 2

$$U_{ch} = U \cdot 3\% = 500 \cdot 3\% = 15V$$

$$\text{a)} P = U \cdot I \cdot \sqrt{3} \cdot \cos \varphi \Rightarrow I = \frac{P}{U \cdot \sqrt{3} \cdot \cos \varphi} = \frac{30000}{500 \cdot 1,73 \cdot 1} = \underline{34,64 A}$$

$$R = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{15}{34,64 \cdot 1} = 0,433 \Omega$$

$$\text{b)} A = \frac{\varrho \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 180 \cdot 1,73}{0,433} = \underline{20,88 \text{ mm}^2}$$

$$\text{c)} A \text{ normalisée} \Rightarrow \underline{25 \text{ mm}^2}$$

Nº 10. 1. 3. 3

$$U_{ch} = U \cdot 2\% = 500 \cdot 2\% = 10V$$

$$P = U \cdot I \cdot \sqrt{3} \cdot \cos \varphi \Rightarrow I = \frac{P}{U \cdot \sqrt{3} \cdot \cos \varphi} = \frac{6000}{500 \cdot 1,73 \cdot 1} = 6,92 A$$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{10}{6,92 \cdot 1} = 1,445 \Omega$$

$$\text{a)} A = \frac{\varrho \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 40 \cdot 1,73}{1,445} = \underline{0,88 \text{ mm}^2}$$

$$\text{b)} A \text{ normalisée} \Rightarrow \underline{1,5 \text{ mm}^2}$$

Nº 10. 1. 3. 4

$$P_{\text{totale}} = P_1 + P_2 + P_3 = 7,6 + 4,2 + 2,8 = 14,6 \text{ kW}$$

$$\text{charge ohmique} \Rightarrow \cos \varphi = 1 \quad U_{ch} = 310 \cdot 5\% = 19V$$

$$\text{a)} P = U \cdot I \cdot \sqrt{3} \cdot \cos \varphi \Rightarrow I = \frac{P}{U \cdot \sqrt{3} \cdot \cos \varphi} = \frac{14600}{380 \cdot 1,73 \cdot 1} = \underline{22,183 A}$$

$$Rl = \frac{U_{ch}}{I} = \frac{19}{22,183} = 0,856 \Omega$$

$$\text{b)} R = \frac{\varrho \cdot l \cdot \sqrt{3}}{A} \Rightarrow A = \frac{\varrho \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 260 \cdot 1,73}{0,856} = \underline{9,2 \text{ mm}^2}$$

10. 1. 3. 4 Suite

- c) A normalisée = 10 mm^2
d) I de consigne = 25 A
e) A selon I consigne = 6 mm^2

N° 10. 1. 3. 5

$$U_{ch} = U \cdot 4,5\% = 380 \cdot 4,5\% = 17,1 \text{ V}$$

$$P = U \cdot I \cdot \sqrt{3} = I = \frac{P}{U \cdot \sqrt{3}} = \frac{12000}{380 \cdot 1,73} = 18,23 \text{ A}$$

$$Rl = \frac{U_{ch}}{I} = \frac{17,1}{18,23} = 0,938 \Omega$$

a) $R = \frac{\varphi \cdot l \cdot \sqrt{3}}{A} \Rightarrow A = \frac{\varphi \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 1400 \cdot 1,73}{0,938} = \underline{\underline{45,18 \text{ mm}^2}}$

b) $A = \phi^2 \cdot 0,785 \Rightarrow \phi = \sqrt{\frac{A}{0,785}} = \sqrt{\frac{45,18}{0,785}} = \underline{\underline{7,58 \text{ mm}}} \Rightarrow \underline{\underline{8 \text{ mm}}}$

N° 10. 1. 3. 6

$$U_{ch} = U \cdot 1,8\% = 380 \cdot 1,8\% = 6,84 \text{ V}$$

$$P = n \cdot P = 60 + 72 + 48 \cdot 51 = 9180 \text{ W}$$

$$P = U \cdot I \cdot \sqrt{3} \cdot \cos \varphi \Rightarrow I = \frac{P}{U \cdot \sqrt{3} \cdot \cos \varphi} = \frac{9180}{380 \cdot 1,73 \cdot 0,95} = 14,68 \text{ A}$$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{6,84}{14,68 \cdot 0,95} = 0,49 \Omega$$

a) $R = \frac{\varphi \cdot l \cdot \sqrt{3}}{A} \Rightarrow A = \frac{\varphi \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 72 \cdot 1,73}{0,49} = \underline{\underline{4,45 \text{ mm}^2}}$

b) A normalisée = 6 mm^2

c) A selon I de consigne = $3,5 \text{ mm}^2$

N° 10. 1. 3. 7

$$U_{ch} = U \cdot 5\% = 500 \cdot 5\% = 25 \text{ V}$$

$$P = U \cdot I \cdot \sqrt{3} \cdot \cos \varphi \Rightarrow I = \frac{P}{U \cdot \sqrt{3} \cdot \cos \varphi} = \frac{43000}{500 \cdot 1,73 \cdot 0,7} = 70,93 \text{ A}$$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{25}{70,93 \cdot 0,7} = 0,503 \Omega$$

10.1.3.7 Suite

$$a) R = \frac{\varrho \cdot l \cdot \sqrt{3}}{A} \Rightarrow A = \frac{\varrho \cdot l \cdot \sqrt{3}}{R} = \frac{0,029 \cdot 65 \cdot 1,73}{0,5035} = \underline{\underline{6,48 \text{ mm}^2}}$$

$$b) A \text{ normalisée} = \underline{\underline{10 \text{ mm}^2}}$$

$$c) I \text{ de consigne} = \underline{\underline{80 \text{ A}}}$$

$$d) A \text{ selon } I \text{ de consigne} = \underline{\underline{25 \text{ mm}^2}}$$

N° 10.1.3.8

$$P_1 = \frac{P_{\text{QJ}}}{N} = \frac{25}{0,55} = 45,45 \text{ kW}$$

$$P = U \cdot I \cdot \sqrt{3} \cdot \cos \varphi \Rightarrow I = \frac{P}{U \cdot \sqrt{3} \cdot \cos \varphi} = \frac{45454,54}{380 \cdot 1,73 \cdot 0,95} = 72,7 \text{ A}$$

$$U_{ch} = U \cdot \% = 380 \cdot 3,2\% = 12,16 \text{ V}$$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{12,16}{72,7 \cdot 0,95} = 0,176 \Omega$$

$$a) R = \frac{\varrho \cdot l \cdot \sqrt{3}}{A} \Rightarrow A = \frac{\varrho \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 170 \cdot 1,73}{0,176} = \underline{\underline{29,27 \text{ mm}^2}} \Rightarrow \underline{\underline{35 \text{ mm}^2}}$$

$$I_2 = \frac{P}{U \cdot \sqrt{3} \cdot \cos \varphi} = \frac{45454,54}{220 \cdot 1,73 \cdot 0,95} = 125,57 \text{ A}$$

$$U_{ch} = U \cdot \% = 220 \cdot 3,2\% = 7,04 \text{ V}$$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{7,04}{125,57 \cdot 0,95} = 0,059 \Omega$$

$$R = \frac{\varrho \cdot l \cdot \sqrt{3}}{A} \Rightarrow A = \frac{\varrho \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 170 \cdot 1,73}{0,059} = \underline{\underline{87,33 \text{ mm}^2}} \Rightarrow \underline{\underline{95 \text{ mm}^2}}$$

N° 10.1.3.9

$$U_{ch \max} = 5\% \Rightarrow U_{ch} = U \cdot \% = 380 \cdot 5\% = 19 \text{ V}$$

$$I_h = \frac{A \cdot \text{kW}}{\text{kW}} = \frac{2 \cdot 12}{1} = 24 \text{ A}$$

$$I \text{ de'marrage} = I_n \cdot 6 = 24 \cdot 6 = 144 \text{ A}$$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{19}{144 \cdot 0,87} = 0,151 \Omega$$

$$R = \frac{\varrho \cdot l \cdot \sqrt{3}}{A} \Rightarrow A = \frac{\varrho \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 120 \cdot 1,73}{0,1516} = \underline{\underline{83,99 \text{ mm}^2}}$$

$$A \text{ normalisée} = \underline{\underline{25 \text{ mm}^2}}$$

N° 10.1.3.10

$$U_{ch} = U \cdot \% = 380 \cdot 2 \% = 7,6 V$$

$$a) I = \frac{A \cdot kW}{kW} = \frac{2 \cdot 4}{1} = \underline{\underline{8 A}}$$

$$b) I_{amont} = I_n \cdot n_3 = 8 \cdot n_3 = 24 = \underline{\underline{25 A}}$$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{7,6}{8 \cdot 0,85} = 1,11 \Omega$$

$$c) R = \frac{\rho \cdot l \cdot \sqrt{3}}{A} = A = \frac{\rho \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 18 \cdot 1,73}{1,1176} = \underline{\underline{0,488 mm^2}} \Rightarrow \underline{\underline{1,5 mm^2}}$$

$$d) A \text{ selon } I \text{ de consigne} = \underline{\underline{6 mm^2}}$$

$$e) \text{ Pour } 25 A \Rightarrow A = \underline{\underline{6 mm^2}}$$

N° 10.1.3.11

$$U_{ch} = U \cdot \% = 380 \cdot 2 \% = 7,6 V$$

$$a) I = \frac{A \cdot kW}{kW} = \frac{2 \cdot 4}{1} = \underline{\underline{8 A}}$$

$$b) I_{amont} = I_n \cdot n_3 = 8 \cdot n_3 = \underline{\underline{24 A}} \Rightarrow \underline{\underline{25 A}}$$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{7,6}{8 \cdot 0,85} = 1,11 \Omega$$

$$c) R = \frac{\rho \cdot l \cdot \sqrt{3}}{A} \Rightarrow A = \frac{\rho \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 48 \cdot 1,73}{1,1176} = \underline{\underline{1,3 mm^2}} \Rightarrow \underline{\underline{1,5 mm^2}}$$

$$d) A \text{ selon } I \text{ de consigne} = \underline{\underline{6 mm^2}}$$

$$e) \text{ Pour } 25 A \Rightarrow A = \underline{\underline{6 mm^2}}$$

N° 10.1.3.12

$$U_{ch} = U \cdot \% = 500 \cdot 4 \% = 20 V$$

$$a) I = \frac{P}{U \cdot \sqrt{3} \cdot \cos \varphi \cdot n} = \frac{10000}{500 \cdot 1,73 \cdot 0,85 \cdot 0,86} = \underline{\underline{15,79 A}}$$

$$b) I_{démarrage} = 8 \cdot I_n = 8 \cdot 15,79 = \underline{\underline{126,37 A}}$$

$$c) I \text{ de consigne} = n \cdot I_n = 5 \cdot 15,79 = 78,95 \Rightarrow \underline{\underline{80 A}}$$

$$d) A_1 = 80 A \Rightarrow \underline{\underline{25 mm^2}}$$

$$e) I = I_n = \underline{\underline{15,79 A}}$$

$$R = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{20}{15,79 \cdot 0,85} = 1,489 \Omega$$

$$f) A = \frac{\rho \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 60 \cdot 1,73}{1,489} = \underline{\underline{1,22 mm^2}} \Rightarrow \underline{\underline{1,5 \Phi}} \Rightarrow \underline{\underline{2,5 mm^2}} \text{ selon } I_n!$$

N° 10.1.3.13

$$U_{ch} = U \cdot \% = 380 \cdot 5 \% = 19 V$$

$$I = \frac{P}{U \cdot \sqrt{3} \cdot \cos \varphi \cdot n} = \frac{22000}{380 \cdot 1,73 \cdot 0,88 \cdot 0,88} = 43,16 A$$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{19}{43,16 \cdot 0,88} = 0,5 \Omega$$

a) $A = \frac{\varphi \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 120 \cdot 1,73}{0,5} = 7,27 \text{ mm}^2 \Rightarrow 10 \text{ mm}^2$

b) $I \text{ de consigne} = \sim 1,5 \cdot In = 1,5 \cdot 43,16 \Rightarrow 63 A$ (dent + Rapide)

c) $I 63 A \Rightarrow A = 16 \text{ mm}^2$

N° 10.1.3.14

$$U_{ch} = \max 5\% \Rightarrow U \cdot 5\% = 380 \cdot 5\% = 19 V$$

a) $I = \frac{P}{U \cdot \sqrt{3} \cdot \cos \varphi \cdot n} = \frac{25000}{380 \cdot 1,73 \cdot 0,88 \cdot 0,89} = 48,5 A$

b) $I \text{ consigne} = 1,2 \cdot In = 1,2 \cdot 48,5 = 58,2 A \Rightarrow 63 A$

$$Rl = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{19}{48,5 \cdot 0,88} = 0,445 \Omega$$

c) $A_1 \text{ selon } \% \text{ amont} \Rightarrow 63 A \Rightarrow 16 \text{ mm}^2$

d) $A = \frac{\varphi \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 5,7 \cdot 1,73}{0,445} = 0,388 \text{ mm}^2 \Rightarrow \text{selon thermique} = 16 \text{ mm}^2$

N° 10.1.3.15

a) $U_{ch} = N° 14 = 19 V$ a) $In = N° 14 = 48,5 A$

b) $I = N° 14 = 63 A$ c) $A_1 = N° 14 = 16 \text{ mm}^2$

$$Rl = N° 14 = 0,445 \Omega$$

d) $R = \frac{P \cdot l \cdot \sqrt{3}}{A} \Rightarrow A = \frac{\varphi \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 114 \cdot 1,73}{0,445} = 7,76 \text{ mm}^2 \Rightarrow 10 \text{ mm}^2$

d) $A \text{ selon thermique} \Rightarrow 16 \text{ mm}^2$

e) $A = 16 \text{ mm}^2$

N° 10.1.3.16

a) $In \text{ pour } 220 V = 3,5 \cdot P = 3,5 \cdot 4 = 14 A$

b) " $380 V = 2 \cdot P = 2 \cdot 4 = 8 A$

c) " $500 V = 1,6 \cdot P = 1,6 \cdot 4 = 6,4 A$

Nº 12.3.1.9

$$\Theta = \frac{\Theta}{n} = \frac{2520}{2} = 1260 \text{ A}$$

$$I = \frac{\Theta}{N} = \frac{1260}{2800} = \underline{0,45 \text{ A}}$$

Nº 12.3.1.10

$$I = \frac{S}{U} = \frac{130}{230} = 0,565$$

$$N = \frac{\Theta}{I} = \frac{4300}{0,565} = \underline{7608 \text{ sp}}$$

Nº 12.3.1.11

$$Z = \frac{U^2}{P} \Rightarrow Z = \frac{U^2}{S} \Rightarrow U = \sqrt{S \cdot Z} = \sqrt{191 \cdot 90} = 131,11 \text{ V}$$

$$I = \frac{S}{U} = \frac{191}{131,11} = 1,457 \text{ A}$$

$$\Theta = N \cdot I = 820 \cdot 1,457 = 1195 \text{ A}$$

$$\text{ou } S = U \cdot I \Rightarrow \left[I = \frac{U}{R} \right] \Rightarrow S = U \cdot \frac{U}{R} \Rightarrow S = \frac{U^2}{R} \Rightarrow S = \frac{U^2}{Z} \Rightarrow U = \sqrt{S \cdot Z} !$$

Nº 12.3.1.12

$$R_1 = R_{\min} + R = 0 + 200 = 200 \Omega$$

$$R_2 = R_{\max} + R = 250 + 200 = 450 \Omega$$

$$\text{a) } I_1 = \frac{U}{R_1} = \frac{220}{200} = \underline{1,1 \text{ A}}$$

$$\text{a) } I_2 = \frac{U}{R_2} = \frac{220}{450} = \underline{0,4889 \text{ A}}$$

$$\text{b) } \Theta_1 = N \cdot I_1 = 2520 \cdot 1,1 = \underline{2772 \text{ A}}$$

$$\text{b) } \Theta_2 = N \cdot I_2 = 2520 \cdot 0,4889 = \underline{1232 \text{ A}}$$

10.1.S.16 Suite

d) $I \text{ de consigne Pour } 220 \text{ V} = 4 \cdot I_n = 4 \cdot 14 = 56 \Rightarrow \underline{\underline{63 \text{ A}}}$

e) " " $380 \text{ V} = 3 \cdot I_n = 3 \cdot 8 = 24 \Rightarrow \underline{\underline{25 \text{ A}}}$

f) " " $500 \text{ V} = 3 \cdot I_n = 3 \cdot 6,4 = 19,2 \Rightarrow \underline{\underline{20 \text{ A}}}$

g) $A \text{ selon } I \text{ amont } 220 \text{ V} = 63 \text{ A} \Rightarrow \underline{\underline{16 \text{ mm}^2}}$

h) " " $380 \text{ V} = 25 \text{ A} \Rightarrow \underline{\underline{6 \text{ mm}^2}}$

i) " " $500 \text{ V} = 20 \text{ A} \Rightarrow \underline{\underline{4 \text{ mm}^2}}$

$U_{ch} \text{ pour } 220 \text{ V} = U \cdot \% = 220 \cdot 4\% = 8,8 \text{ V}$

$" \quad 380 \text{ V} = U \cdot \% = 380 \cdot 4\% = 15,2 \text{ V}$

$" \quad 500 \text{ V} = U \cdot \% = 500 \cdot 4\% = 20 \text{ V}$

$R \cdot l \text{ pour } 220 \text{ V} = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{8,8}{14 \cdot 0,84} = 0,748 \Omega$

$" \quad " \quad 380 \text{ V} = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{15,2}{8 \cdot 0,84} = 2,26 \Omega$

$" \quad " \quad 500 \text{ V} = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{20}{6,4 \cdot 0,84} = 3,72 \Omega$

k) $A = \frac{g \cdot l \cdot \sqrt{3}}{R} = \text{pour } 220 \text{ V} = \frac{0,0175 \cdot 150 \cdot 1,73}{0,748} = \underline{\underline{6,07}} \Rightarrow \underline{\underline{6 \text{ mm}^2}}$

l) " " " $380 \text{ V} = \frac{0,0175 \cdot 150 \cdot 1,73}{2,26} = \underline{\underline{8,01}} \Rightarrow \underline{\underline{2,5 \text{ mm}^2}}$

m) " " " $500 \text{ V} = \frac{0,0175 \cdot 150 \cdot 1,73}{3,72} = \underline{\underline{1,22}} \Rightarrow \underline{\underline{1,5 \text{ mm}^2}}$

N° 10.1.3.17

$U_{ch} = U \cdot \% \Rightarrow 1\% = 3,8 \text{ V}$

$2\% = 7,6 \text{ V}$

$3\% = 11,4 \text{ V}$

$4\% = 15,2 \text{ V}$

$5\% = 19 \text{ V}$

$I_n = 2 \cdot P = 2 \cdot 3 = 6 \text{ A}$

$R = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{3,8}{6 \cdot 0,85} = 0,745 \Omega$

10. 1. 3. 17 Suite

$$R = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{7,6}{6 \cdot 0,85} = 1,49 \Omega$$

$$R = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{11,4}{6 \cdot 0,85} = 2,235 \Omega$$

$$R = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{15,2}{6 \cdot 0,85} = 2,98 \Omega$$

$$R = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{19}{6 \cdot 0,85} = 3,725 \Omega$$

$$l = \frac{R \cdot A}{\varphi \cdot \sqrt{3}} = \frac{0,745 \cdot 1,5}{0,0175 \cdot 1,73} = 36,88 \text{ m}$$

$$l = \frac{R \cdot A}{\varphi \cdot \sqrt{3}} = \frac{1,49 \cdot 1,5}{0,0175 \cdot 1,73} = \underline{\underline{73,76 \text{ m}}}$$

$$l = \frac{R \cdot A}{\varphi \cdot \sqrt{3}} = \frac{2,235 \cdot 1,5}{0,0175 \cdot 1,73} = \underline{\underline{110,6 \text{ m}}}$$

$$l = \frac{R \cdot A}{\varphi \cdot \sqrt{3}} = \frac{2,98 \cdot 1,5}{0,0175 \cdot 1,73} = \underline{\underline{147,5 \text{ m}}}$$

$$l = \frac{R \cdot A}{\varphi \cdot \sqrt{3}} = \frac{3,725 \cdot 1,5}{0,0175 \cdot 1,73} = \underline{\underline{184,4 \text{ m}}}$$

Nº 10. 1. 3. 18

$$U_{ch} = U \cdot \% = 380 \cdot 6\% = 22,8 \text{ V}$$

$$In = n \cdot P = 2 \cdot 18 = 36 \text{ A}$$

$$R = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{22,8}{36 \cdot 0,87} = \underline{\underline{0,728 \Omega}}$$

$$R = \frac{\varphi \cdot l \cdot \sqrt{3}}{A} = \frac{0,0175 \cdot 180 \cdot 1,73}{10} = \underline{\underline{0,545 \Omega}}$$

Solution : OUI car R_l est plus petite que R_l calculée !

$$A \text{ suffisante : } \frac{\varphi \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 180 \cdot 1,73}{0,728} = \underline{\underline{7,495 \text{ mm}^2}}$$

N° 10.2.1

$$P_{chu.} = P \cdot 5\% = 12000 \cdot 5\% = 600 \text{ W}$$

$$a) I = \frac{P}{U} = \frac{12000}{220} = \underline{\underline{54,54 \text{ A}}}$$

$$b) I_{consigne} = 63 \text{ A} \Rightarrow A = \underline{\underline{16 \text{ mm}^2}}$$

$$P = R \cdot I^2 \Rightarrow R = \sqrt{\frac{P}{I^2}} = \sqrt{\frac{12000}{54,54^2}} = \underline{\underline{0,20 \Omega}}$$

$$c) R = \frac{\varrho \cdot l \cdot A}{A} \Rightarrow A = \frac{\varrho \cdot l \cdot \vartheta}{R} = \frac{0,0175 \cdot 125 \cdot 2}{0,20} = \underline{\underline{21,87 \text{ mm}^2}} \Rightarrow \underline{\underline{25 \text{ mm}^2}}$$

N° 10.2.2

$$P = U \cdot I \cdot \cos \varphi = 380 \cdot 25 \cdot 1 = 9500 \text{ W}$$

$$\text{Perde} = P \cdot \% = 9500 \cdot 4\% = 380 \text{ W}$$

$$P = R \cdot I^2 \Rightarrow R = \sqrt{\frac{P}{I^2}} = \sqrt{\frac{380}{25^2}} = \underline{\underline{0,608 \Omega}}$$

$$a) A = \frac{\varrho \cdot l \cdot \vartheta}{R} = \frac{0,0175 \cdot 100 \cdot 2}{0,608} = \underline{\underline{5,75 \text{ mm}^2}} \Rightarrow \underline{\underline{6 \text{ mm}^2}}$$

$$P = U \cdot I \cdot \cos \varphi = 380 \cdot 25 \cdot 0,8 = 7600 \text{ W}$$

$$\text{Perde} = P \cdot \% = 7600 \cdot 4\% = 304 \text{ W}$$

$$P = R \cdot I^2 \Rightarrow R = \sqrt{\frac{P}{I^2}} = \sqrt{\frac{304}{25^2}} = \underline{\underline{0,4864 \Omega}}$$

$$b) A = \frac{\varrho \cdot l \cdot \vartheta}{R} = \frac{0,0175 \cdot 100 \cdot 2}{0,4864} = \underline{\underline{7,196 \text{ mm}^2}} \Rightarrow \underline{\underline{10 \text{ mm}^2}}$$

c) A selon % amont : 25 A \Rightarrow 4# souple.

N° 10.2.3

$$\text{Perde} = P \cdot \% = 15000 \cdot 8\% = 1200 \text{ W}$$

$$P = U \cdot I \cdot \sqrt{3} \Rightarrow I = \frac{P}{U \cdot \sqrt{3}} = \frac{15000}{48 \cdot 1,73} = \underline{\underline{180,43 \text{ A}}}$$

$$P = R \cdot I^2 \cdot \sqrt{3} \Rightarrow R = \frac{P}{I^2 \cdot \sqrt{3}} = \frac{1200}{180,43^2 \cdot 1,73} = \underline{\underline{0,02128 \Omega}}$$

$$a) A = \frac{\varrho \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 60 \cdot 1,73}{0,02128} = \underline{\underline{85,46 \text{ mm}^2}} \Rightarrow \underline{\underline{95 \text{ mm}^2}}$$

$$b) A = \frac{\varrho \cdot l \cdot \sqrt{3}}{R} = \frac{0,029 \cdot 60 \cdot 1,73}{0,02128} = \underline{\underline{141,45 \text{ mm}^2}} \Rightarrow \underline{\underline{150 \text{ mm}^2}}$$

10.2.3 Suite

c) $I = \underline{200 \text{ A}}$

d) $A \text{ pour } 200 \text{ A en a.mont} = \underline{95 \text{ mm}^2 \text{ cu.}}$

N° 10.2.4

$U_{ch} = U \cdot \% = 380 \cdot 1\% = 3,8 \text{ V}$

$P = U \cdot I \cdot \sqrt{3} \cdot \cos \varphi = 380 \cdot 100 \cdot 1,73 \cdot 0,8 = 52592 \text{ W}$

$\text{Perfe} = P \cdot \% = 52592 \cdot 1\% = 525,92 \text{ W}$

$P = R \cdot I^2 \cdot \sqrt{3} \Rightarrow R = \frac{P}{I^2 \cdot \sqrt{3}} = \frac{525,92}{100^2 \cdot 1,73} = 0,03036 \Omega$

a) $A \text{ pour } 100 \text{ A} = \underline{35 \text{ mm}^2}$

$R = \frac{U_{ch}}{I \cdot \cos \varphi} = \frac{3,8}{100 \cdot 0,8} = 0,0475 \Omega$

b) $A = \frac{\varphi \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 42 \cdot 1,73}{0,0475} = \underline{26,8 \text{ mm}^2} \Rightarrow \underline{35 \text{ mm}^2}$

c) $A = \frac{\varphi \cdot l \cdot \sqrt{3}}{R} = \frac{0,0175 \cdot 40 \cdot 1,73}{0,03036} = \underline{41,93 \text{ mm}^2} \Rightarrow \underline{50 \text{ mm}^2}$

d) $A = \underline{50 \text{ mm}^2}$