Sprawozdanie 1

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U(V)	u(U)[V]	I[mA]	u(I)[mA]	R[Ω]	$u_c(R)[\Omega]$	$\bar{R}[\Omega]$	$u(\bar{R})[\Omega]$	$R_w[\Omega]$	$u_c(R_w)[\Omega]$
3.29	±0.02	18.7	±0.2	175.94	± 2.16				
4.78	±0.02	27.8	0.3	171.94	± 1.99				
6.35	±0.02	36.1	±0.3	175.90	± 1.70	175	±0.62	175.75	
7.89	±0.03	44.9	±0.4	175.72	± 1.41				
9.50	±0.03	54.2	±0.4	175.28	± 1.51				
12.44	±0.04	71.0	±0.6	175.21	± 1.58				

Przykładowe obliczenia:

Delta niepewnosci Napiecia:
$$\Delta u(U) = 0.5\% \cdot rdg + 1 \cdot dgt = \frac{0.5}{100} \cdot 3.29 + 0.01 = 0.0264 \approx 0.03$$
Niepewnosc napiecia:
$$u(U) = \frac{\Delta u(U)}{\sqrt{3}} = 0.015 \approx 0.02$$
Delta niepewnosci natezenia:
$$\Delta u(I) = 1.2\% \cdot rdg + 1 \cdot dgt = \frac{1.2}{100} \cdot 18.7 + 0.1 = 0.3244$$
Niepewnosc natezenia:
$$u(I) = \frac{\Delta u(I)}{\sqrt{3}} \approx 0.2$$
Opor:
$$R = \frac{U}{I} = \frac{3.29}{0.0187} \approx 175.94 \ \Omega$$
Niepewnosc calkowita R:
$$u_c(R) = \sqrt{\sum_{j=1}^{k} \left(\frac{\partial f}{\partial x_j}\right)^2 u^2(x_j)} = \sqrt{\frac{u^2(U)}{I^2} + \frac{U^2 \cdot u^2(I)}{I^4}} = = \sqrt{\frac{\left(\frac{0.02}{1000}\right)^2}{0.0187^2} + \frac{3.29^2 \cdot \left(\frac{0.2}{1000}\right)^2}{0.0187^4}} \approx 2.16$$
Wartosc srednia R:
$$\bar{R} = \frac{\sum_{i=1}^{n} x_i}{n} = 174.9983333 \approx 175\Omega$$
Niepewnosc wartosci sredniej R:
$$* \ u(\bar{R}) = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n(n-1)}} \approx 0.62$$
Opor wewnetrzny:
$$R_w = \frac{1}{A} = \frac{1}{0.00569} \approx 175.75 \ \Omega$$

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