

AWG Wire Resistance Calculator

Estimate conductor resistance from AWG size, material, conductor temperature, one-way length, and the number of conductors in the path. Verify published conductor data when resistance affects design or compliance.

Generated October 10, 2026

<https://www.elecatrix.com/wire-raceway-ampacity/awg-wire-resistance-calculator/>

Inputs

Input	Value	Unit
AWG size	12 AWG	AWG
Conductor material	Copper	
Conductor temperature	20	C
One-way length	100	ft
Current-carrying conductors	2	

Results

Result	Value	Unit
AWG diameter	80.8081	mil
Circular mil area	6529.9468	cmil
Adjusted resistance	1.5882	ohm/1000 ft
Resistance at 20 C	1.5882	ohm/1000 ft
Temperature factor	1	x
Circuit resistance	0.3176	ohm

Calculation details

Detail	Value	Unit
Calculation basis	AWG diameter uses the standard geometric AWG progression, then resistance is estimated from material K value and adjusted with the entered temperature coefficient.	

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Selection boundary

Resistance estimate only; verify conductor construction, stranding, temperature, manufacturer data, and applicable electrical-code requirements before design use.

Formulas

K =material resistance constant, α =temperature coefficient, $\Delta T = T - 20^\circ C$

L =one-way conductor length, N =conductors included in the resistance path

$$d_{in} = 0.005 \times 92^{(36-AWG)/39}$$

$$d_{mil} = 1000 \times d_{in}$$

$$CM = d_{mil}^2$$

$$R_{20} = (K \times 1000 / CM)$$

$$R_T = R_{20} \times (1 + \alpha \times (T - 20))$$

$$R_{circuit} = (R_T \times L \times N / 1000)$$

Warnings and limitations

This is a wire-resistance estimate, not an ampacity, voltage-drop approval, conductor-selection, or code-compliance result. Verify manufacturer data and project conditions.