



R270 Resistor Alloy

R270 is a copper-manganese-nickel alloy with high resistivity and very low temperature coefficient of resistance. It is commonly used in low conductivity applications such as shunts and precision resistors in high-power electronics found in electric or electrified vehicles. R270 is produced using a patented casting process that results in homogeneous alloying and consistent, stable performance.

Chemical Composition

Element	Composition (wt%)
Copper	86
Manganese	10
Nickel	4

Typical Physical Properties

Density	Melting Point	Coefficient of Thermal Expansion	Specific Heat	Thermal Conductivity	Maximum Use Temperature
0.296 lb./in ³ (8.19 gm/cm ³)	1760°F (960°C)	10.5 μin/in·°F (18x10 ⁻⁶ K ⁻¹)	0.096 BTU/lb·°F (0.4 J/g·K)	130 BTU·in/hr·ft ² ·°F (20 W/m·K)	140°F (60°C) (Higher temperatures possible with stabilization.)

Typical Mechanical Properties - Nominal

	Yield Strength ksi (MPa)	Tensile Strength ksi (MPa)	Elongation at Break	Young's Modulus ksi (GPa)	Poisson's Ratio	Hardness - Vickers
Annealed	15-20 (102-138)	50-60 (310-380)	40-50%	20,000 (138)	0.33	< 130
Hard	85-95 (586-655)	90-100 (620-690)	2-6%	20,000 (138)	0.33	> 200

Electrical Properties - Nominal

Electrical Resistivity	Temperature Coefficient of Resistance (20° to 50°C)	Thermal EMF vs. Copper
Annealed: 38 +/- 2 $\mu\Omega\cdot\text{cm}$ Hard: 40 +/- 2 $\mu\Omega\cdot\text{cm}$	+/- 10 ppm/°C	1 $\mu\text{V}/^\circ\text{C}$

Forms Available

R270 Resistor Alloy is available in wire, formed wire, strip and sheet.

Usage Guidelines

To provide the most stable resistivity over time, resistors should have a thermal stabilization to reduce internal stresses. Contact our engineers for assistance with your application at +1-800-375-4205.

Disclaimer:

Only the buyer can determine the appropriateness of any processing practice, end-product or application. Materion does not make any warranty regarding its recommendations, the suitability of Materion's product, or its processing suggestions for buyer's end product, application or equipment.

The properties presented on this data sheet are for reference purposes only, intended only to initiate the material selection process. They do not constitute, nor are they intended to constitute, a material specification. Material will be produced to one of the applicable industry standards, if any, listed in the Industry Standards and Specification section.

Actual properties may vary by thickness and/or part number. Please contact your local sales engineer for detailed properties to be used in simulation.

Any properties marked as preliminary are subject to change at any time as the manufacturing process is further refined.