



## R270 Resistor Alloy

Materion R270 Resistor Alloy is a Copper-Manganese-Nickel alloy with low resistivity and very low Thermal Coefficient of Resistance (TCR). Commonly used for precision resistors, R270 is produced using a patented casting process, which produces homogeneous alloying and consistent, stable performance. Compare with Manganin<sup>®</sup>. Available forms include wire, formed wire, strip, and sheet.

### NOMINAL COMPOSITION

Cu	86%
Mn	10%
Ni	4%

### ELECTRICAL PROPERTIES

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

### MECHANICAL PROPERTIES - Annealed, Nominal

Yield Strength	102-138	MPa	(15-20 ksi)
Ultimate Tensile Strength	310-380	MPa	(45-55 ksi)
Elongation at Break	40-50%	(%)	
Young's Modulus	138	GPa	(20,000 ksi)
Poisson's Ratio	0.33		
Hardness - Vickers	< 130	HV	

### PHYSICAL PROPERTIES

Density	8.19	$\text{g}/\text{cm}^3$	(0.296 $\text{lb}/\text{in}^3$ )
Specific Heat	0.4	$\text{J}/\text{g}\cdot\text{K}$	(0.096 $\text{BTU}/\text{lb}\cdot^\circ\text{F}$ )
Coefficient of Thermal Expansion	$18\times 10^{-6}$	$\text{K}^{-1}$	(10.5 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$ )
Thermal Conductivity	20	$\text{W}/\text{m}\cdot\text{K}$	(130 $\text{BTU}\cdot\text{in}/\text{hr}\cdot\text{ft}^2\cdot^\circ\text{F}$ )
Melting Point	960	°C	(1760 °F)
Maximum Use Temperature	60	°C	(Higher temperatures possible with stabilization.)

### USAGE GUIDELINES

To provide the most stable resistivity over time, resistors should have a thermal stabilization to reduce internal stresses. Please contact us for guidance on your application.

#### MATERION TECHNICAL MATERIALS

5 Wellington Road  
Lincoln, RI 02865  
phone: 401.333.1700 fax: 401.333.2848  
technicalmaterials-info@materion.com