


# Niclal 38

## Niclal 38 (Shunt Grade), CuMn10Ni4

Identification				
VMI No.	38			
UNS No.	n/a			
Relevant Specifications				
Similar to	Alloy 38, , CuMn10Ni4, Niclal 37			
Forms	Strip	Wire	Bar	Sheet
	*	*	*	*
Description	Niclal 38 is a precision resistance alloy, with moderate Resistivity, low Temperature coefficient of resistance and low thermal EMF versus Copper. With high stability of electrical resistance, good working properties and very good weldability, Alloy 38 is specially dedicated to precision resistors and electrical shunts.			
Chemical Composition (%)				
Copper	86 Nominal			
Manganese	10 Nominal			
Nickel	4 Nominal			
Mechanical Properties (all values are for annealed temper; not intended for specification)				
Tensile	55 ksi			
	380 MPa			
Yield	29 ksi			
	200 MPa			
Elongation	30 % in 2"			
	30 % in 50mm			
Hardness	50 HRB			
	90 Hv			
Physical Properties				
Density	0.3071 lb/in <sup>3</sup>			
	8.497 g/cm <sup>3</sup>			
Resistivity (Nominal)	230 Ohm•circ mil/ft			
	38 microOhm•cm			
Coefficient of Thermal Expansion from 68°F (20°C) to  (micro-in/in-°F) (micro-m/m-K)	212°F	392°F	572°F	752°F
	100°C	200°C	300°C	400°C
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# Cu Mn10 Ni4

## DESCRIPTION

Niclal 38 is a precision resistance alloy, with moderate Resistivity, low Temperature coefficient of resistance and low thermal EMF versus Copper.

With high stability of electrical resistance, good working properties and very good weldability, Niclal 38 is specially dedicated to precision resistors, electrical shunts which control and measure the current through devices such electricity meters or DC ammeters.

Brand Name	<b>NICLAL 38</b>	
Abbreviation	<b>Cu - Mn - Ni</b>	
Nominal analysis		
Cu %	Mn %	Ni %
Remain	10	4

## Electrical Properties in annealed temper

Electrical Resistivity at 20 °C	<b>38 <math>\mu\text{ohm} \times \text{cm}</math></b>
Temperature Coefficient of Electrical Resistance between -20 and +150 °C	<b>+/- 20 ppm/°C</b>
Thermo EMF against Copper at 20 °C	<b>- 1.02 <math>\mu\text{V}/\text{°C}</math></b>

## Physical Properties

Density at 20 °C	<b>8.77 g/cm<sup>3</sup></b>
Thermal conductivity at 20 °C	<b>22 W/m x °K</b>
Coefficient of thermal expansion at 20 °C	<b>18 x 10<sup>-6</sup> / °C</b>

## Forms manufactured

Wire (annealed temper)	<b>diameter : 0.8 mm to 14 mm</b>
Rods (1/4 hard temper)	<b>diameter : 1 mm to 19 mm</b>
Strip	<b>thickness : 0.08 mm to 3.5 mm</b>
	<b>width : 3 mm to 380 mm</b>
Cut to length	<b>thickness : 0.25 mm to 3.5 mm</b>
	<b>width : 20 mm to 380 mm</b>
	<b>length : 500 mm to 3500 mm</b>

