

Wieland-F12 Resistance alloy

Extruded/Drawn Products

Wieland-FY2 is a resistance alloy characterised by its low temperature coefficient of the electric resistance and its low thermal electromotive force versus copper. The alloy also exhibits long-term stability of its electric resistance.

The alloy is suitable for the production of precision, normal and shunt resistors. Wieland-F12 is merchandised under the family brand **RESISTAN®** which includes all Wieland products for resistors.

Chemical composition*

Cu	balance
Mn	12%
Ni	2%

* Reference values in % by weight

Material designation

EN	not standardised
UNS	not standardised
DIN*	CuMn12Ni, 2.1362
BS*	not standardised
NF*	not standardised

* former national standards

Physical properties*

Electrical conductivity	MS/m	2.4
	% IACS	4.1
Resistivity	$\Omega \text{ mm}^2/\text{m}$	0.43
	\pm	5%
Thermal conductivity	W/(m*K)	22
Coefficient of thermal expansion	(0-400°C) $10^{-6}/\text{K}$	19.5
Density	g/cm ³	8.4
Modulus of elasticity		130

* Reference values at room temperature

1 GPa = 1 kN/mm²

1 MS/m = 1 m/ $\Omega \cdot \text{mm}^2$

Fabrication properties

Forming

Machinability	20%
(CuZn39Pb3 = 100 %)	
Cold working	good
Hot working	good

Joining

Hard soldering	good
Soft soldering	good
Resistance welding and resistance butt welding	good
Inert-gas-shielded arc welding	good
Electron beam welding	good
Laser beam welding	good

Heat treatment

Melting temperature	960°C
Hot working	750-850°C
Soft annealing	600-700°C

Corrosion resistance

The corrosion resistance of Cu-Mn alloys is largely identical to that of pure copper. However, manganese-containing copper alloys tend to heal damaged protective layers more easily.

Compared to brass, F12 is insensitive to stress corrosion cracking.

Product standards

none

Mechanical properties (values can be achieved and are a function of size and form)

reference values	from (soft)	to (hard)
R _m [MPa]	380	700
R _{p0.2} [MPa]	180	660
A ₁₀ [%]	40	2
HB	75	170

Forms and sizes available

Material										
Wieland	EN designation		Outside diameter		Wall thickness		Circumscribing diameter		Diameter / width across flats	
	Brief designation	Number	from	to	from	to	from*	to	from	to
F12	---	---								
Round tubes			On request							
Drawn sections										
Extruded sections										
Sectional tubes										
Round and polygonal rods									2	50
Round wires									0,3	10
Polygonal wires									2	10

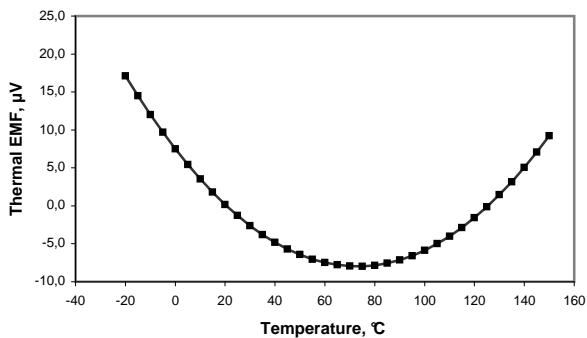
All values in mm

Wieland - F12

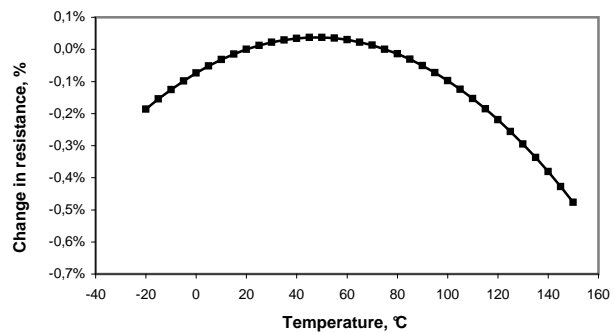
* Depending on the form, cross-sections in the lower size range are also available as wire.

** Flat wires are available with a minimum thickness of 0,3 mm and a maximum width of 20 mm. The ratio of thickness to width must be smaller than 10/1.

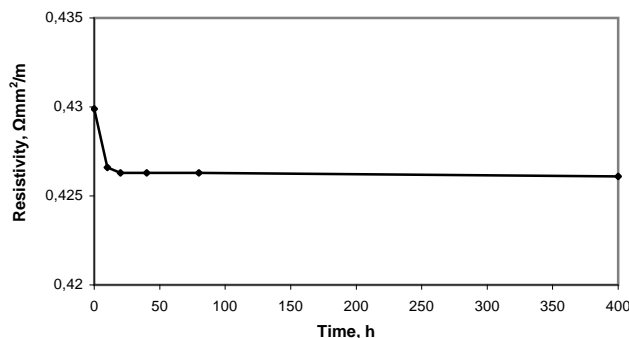
**Thermal EMF of F12 versus copper
(example)**



Deviation of the resistance compared to the value at 20°C



Long-term stability of the resistance at 140°C



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