

Nickel Iron Alloys

NiFe 70/30 & NiFe 52/48

Nickel Iron alloys have been developed to produce high temperature coefficients of resistance (Positive Temperature Coefficient or PTC) in order to provide a 'self-limiting' heating wire. When the temperature of the wire is around 250 °C the element resistance will have doubled and the power output will have halved. This effect has the following advantages:

- Improved temperature control
- Reduced energy consumption
- Reduced power in case of overheating,
- High start-up power.

Nickel Iron Alloys are available in sizes down to 0.09 mm.

Physical and Mechanical Properties

		Units	NiFe 70/30	NiFe 52/48
Maximum continuous operating temperature in air		°C	600	600
		°F	1100	1100
Nominal composition		%	Ni 70 Fe 30	Ni 52 Fe 48
Density at 20°C		g/cm ³	8.45	8.20
		lb/in ³	0.305	0.296
Resistivity at 20°C		μΩcm	21	37
		Ω/cmf	130	220
Coefficient of thermal expansion,	20 – 100°C	1/K	15 x 10 ⁻⁶	10 x 10 ⁻⁶
	68 – 212°F	1/°F	8.3 x 10 ⁻⁶	5.6 x 10 ⁻⁶
Thermal conductivity at	20°C	W/mK	17	17
	68°F	Btu.in/ft ² .h.°F	120	120
Specific heat capacity at	20°C	kJ/kgK	0.52	0.50
	68°F	Btu/lb°F	0.12	0.12
Melting point (approx.)		°C	1430	1435
		°F	2610	2620
Magnetic properties (up to Curie point)			Magnetic	Magnetic
Curie point		°C	610	530
		°F	1130	990
Tensile strength R _m (0.5 mm wire)		N/mm ²	640	610
		lb/in ²	93000	88000
Yield point R _{p0.2} (0.5 mm wire)		N/mm ²	340	340
		lb/in ²	49000	49000
Elongation at break (approx.) (0.5 mm wire)		%	30	30

Temperature Factors

Temp °C	100	150	200	250	300	350	400	450	500
Temp °F	212	302	392	482	572	662	752	842	932
70/30 Ni/Fe	1.35	1.57	1.80	2.05	2.30	2.56	2.82	3.10	3.40
52/48 Ni/Fe	1.33	1.53	1.73	1.93	2.13	2.32	2.49	2.64	2.77

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