Scott Precision Wire
End to end

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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 if 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 °F	600 1100	600 1100
Nominal composition		%	Ni 70 Fe 30	Ni 52 Fe 48
Density at 20°C		g/cm³ lb/in³	8.45 0.305	8.20 0.296
Resistivity at 20°C		µΩcm Ω/cmf	21 130	37 220
Coefficient of thermal expansion,	20 – 100°C 68 – 212°F	1/K 1/°F	15×10^{-6} 8.3×10^{-6}	10×10^{-6} 5.6×10^{-6}
Thermal conductivity at	20°C 68°F	W/mK Btu.in/ft².h.°F	17 120	17 120
Specific heat capacity at	20°C 68°F	kJ/kgK Btu/lb°F	0.52 0.12	0.50 0.12
Melting point (approx.)		°C °F	1430 2610	1435 2620
Magnetic properties (up to Curie point)			Magnetic	Magnetic
Curie point		°C °F	610 1130	530 990
Tensile strength R_m (0.5 mm wire)		N/mm² lb/in²	640 93000	610 88000
Yield point $R_{p0.2}$ (0.5 mm wire)		N/mm² lb/in²	340 49000	340 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