Radiometal 4550

Smiths Advanced Metals

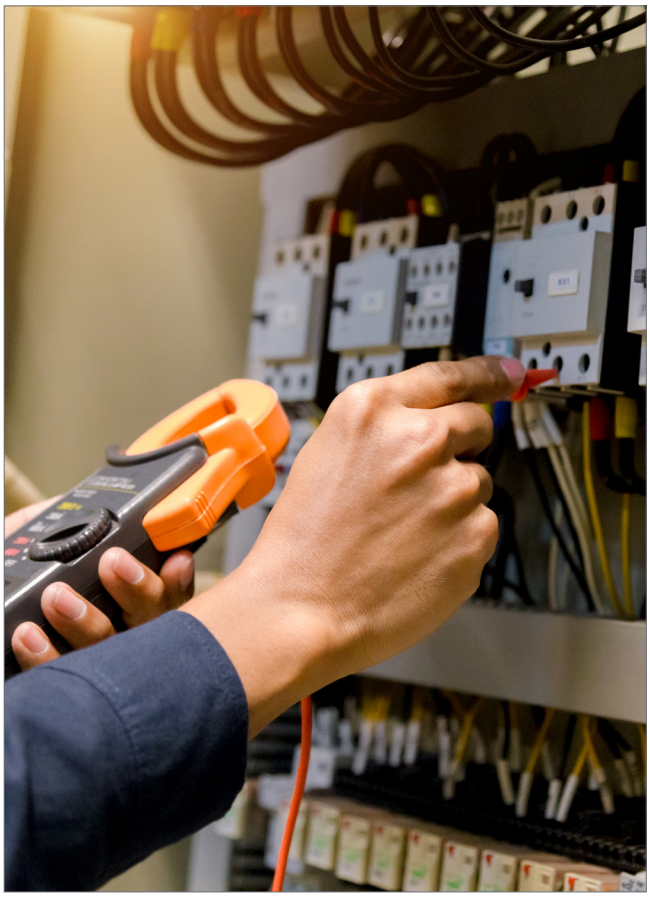
Revision: SAM/datasheets/nickel/radiometal-4550/may-2024

Nickel-Iron Alloy

Highly suitable for transformers and relays.

Radiometal 4550 is a nickel-iron alloy highly advantageous in sensitive electronic relays that respond to weak currents. The material offers excellent permeability with high saturation flux density.

The alloy is also widely employed in transformers, chokes and motors, especially when silicon-iron products do not meet magnetic performance levels. Although considered a more 'niche' product, **Radiometal 4550** represents an attractive engineering material in specific application areas, including protection relays, actuators, servo valves, telecommunications, motors and even missile systems.



Heat Treatment

The alloy is supplied in the hard rolled, hard drawn or softened condition and can be milled, stamped, turned or deep drawn. Following fabrication operations, parts require subsequent heat treatment to maximise magnetic properties. **Radiometal 4550** should be heated at 1180° C (2155° F) in dry hydrogen for 4 hours and then cooled to 300° C (507° F) over 8 hours.

Applications

- Electronic relays
- Transformers
- Servo valves and actuators
- Specialist motors

Benefits

- Excellent magnetic permeability
- High saturation flux density
- Improved magnetic performance compared to silicon-iron alloys
- Straightforward to machine

Machining

The material work hardens readily, so it is important to choose the right tool geometry, material feeds, speeds, and cutting fluids.

Nevertheless, machining nickel-iron alloys is straightforward with high-speed steel or tungsten carbide tooling. Keeping machining blades sharp and speeds low will prevent deceleration by providing enough torque at the cutting edge. Cutting **Radiometal 4550** generates significant heat, so coolant is recommended.

Stock Availability

We stock **Radiometal 4550** in forged bars 6mm to 75mm diameter and 3 metres in length.

Radiometal 4550

Smiths Advanced Metals

* Chemical Composition (weight, %)

	C	Mn	Si	P	S	Cr	Ni	Mo	Co	Cu	Fe
Min.							43.50				
Max	0.05	0.80	0.50	0.03	0.01	0.30	46.50	0.30	0.50	0.30	Bal

Typical Properties

Initial Permeability d.c. μo.4	6000	Coefficient of Linear Expansion/ °C ($x10^6$)	7
Maximum DC Permeability	40000	/ °F ($x10^6$)	3.9
Saturation Induction - Tesla	1.6	Thermal Conductivity (kcal/mh °C)	11
- kGauss	16	(Btu-in/ft^2h°F)	89
Remanence from Saturation - Tesla	1.0	Specific Heat (kcal/kg °C)	0.11
- kGauss	10	(Btu/lb °F)	0.11
Coercivity H_c d.c. - A/m	8	Vickers Hardness (HV) - Hard Rolled	250
- mOe	100	- Annealed	125
Hysteresis Loss at Bsat (J/m^3 cycle)	40	Tensile Strength Hard Rolled (MN/m^2)	775
Curie Temperature (°C)	450	(kpsi)	112
(°F)	842	Tensile Strength Annealed (MN/m^2)	471
Density kg/m^3	8250	(kpsi)	68
lb/in^3	0.298	Young's Modulus (MN/m^2) ($x10^{-3}$)	167
Resistivity (μΩ-m)	0.45	(psi) ($x10^{-6}$)	24
(ohm-cir mil/ft)	271		

Stratton Business Park, London Road, Biggleswade, Bedford-shire SG18 8QB

Tel: +44 (0) 1767 604710

ISO 9001 Quality Management Systems CERTIFIED | AS/EN 9100 Aviation Space and Defence CERTIFIED | EN 9120 Aviation Space and Defence CERTIFIED

UKAS TESTING 1930