

ASTM A753

Type 2 – Alloy 50

Soft Magnetic Alloys



Description

Alloy 50 is a soft magnetic nickel-iron alloy comprising approximately 49% Nickel and balance Iron. It is engineered for applications requiring high initial and maximum permeability, low coercive force, and minimal core loss. This alloy exhibits the highest saturation induction among nickel-iron alloys, making it ideal for efficient magnetic performance in various devices.

AKA: Magnifer® 50, Carpenter High Permeability® 49, Alloy 4750.

Applications

Laminated cores for instrument transformers, magnetic shields, sensitive relay components, solenoid components, LF power transducers, chokes, oscillators.

PHYSICAL PROPERTIES

Density	8.79g/cm ³
Specific gravity	8.18
Curie temperature	460-499°C
Melting Point	1427°C
Electrical resistivity	48 microhm-cm
Thermal conductivity	334.6 W/mK
Specific heat	0.50 J/g°C
Thermal expansion (100°C)	9 ppm/°C

DC MAGNETIC PROPERTIES

Properties	Bar	Strip
Initial permeability B100	16500	112000
Maximum permeability	75000	150000
Coercive force (HC) ¹ /Oersted	0.04/ 0.07	0.05/ 0.06
Saturation inductance (G) ²	15000	15000

¹ From 10,000 gaussses ² From H=100 oersteds

MECHANICAL PROPERTIES

Tensile strength	518 MPa
Yield strength	159 MPa
Elongation	40%
Hardness	80 HRB
Modulus of elasticity	166 MPa

AC MAGNETIC PROPERTIES

Minimum 60Hz AC permeability B40	8000
----------------------------------	------

FORMS AVAILABLE:



Coil



Sheet



Plate



Rod



Bar



Wire

SPECIFICATIONS

ASTM	A753 Type 2
MIL	N-14411C Comp 3
UNS	K94840
AMS	7718 (bar & rod)

CHEMISTRY



47-49%



0.5%



Balance



0.8%



0.05%



0.5%

28 Nickel Ni 58.6934	27 Cobalt Co 58.933	26 Iron Fe 55.847
--------------------------------------	-------------------------------------	-----------------------------------

More than just metal

We're one of Europe's leading suppliers of premium quality refractory metals and alloys, soft magnetic alloys, and controlled expansion alloys. We hold a large stock of UK-certified, materials, all with full chain custody. With a deep technical understanding, comprehensive workshop facilities, and top accreditations, we help our customers get more from their materials.

Knowledge and advice

Our team understands exactly how our products are made, how they will behave in different situations, and how they should perform. Their knowledge and expertise helps save time, effort and cost by ensuring that all materials are sourced, processed and tested to perform in the most effective way.

We partner with leading academic institutions and scientific organisations that add value to our service and help develop solutions to the challenges impacting our customers. We're keen to share these unique insights in order to deliver practical operational improvements.

Workshop and machining

Our purpose-built facilities are centred around a fully equipped workshop designed to address almost any customer request:

- CNC Proturn RLX 1630 lathe for high precision rod and bar processing
- Saws to cut bars, plate and billets from Ø 2mm to Ø 270mm
- Guillotines for sheet and coil
- Grinding machinery
- De-coiler to check for imperfections before shipping
- Coil handling equipment to inspect product before dispatch
- Water jet and laser cutting
- Heat treatments

Quality control

All orders are fully tested before shipping.

Our state-of-the-art metrology lab features:

- Micrometers, verniers and gauges for all applications
- Surface roughness tester
- Straightness and roundness testing apparatus
- Magnetometers for measuring inductance, coercive and saturation
- Capabilities for evaluating properties such as CTE, tensile and elongation.

Best practice

We are committed to continuous improvement, reflected in our achievement of internationally-recognised industry accreditations. These are the foundation of best practice and provide you with solid assurances of competence and integrity:

- **AS9120** certified – a top aerospace industry award.
- **Green Mark level 1** accreditation – an environmental certification that supports greater sustainability.
- **JOSCAR** (the Joint Supply Chain Accreditation Register) accredited – an award that helps to streamline procurement processes.
- **Cyber Essentials** certified – a government-backed programme that provides security assurance of a supplier's digital infrastructure.



Discover how we can **optimise** operational performance

Contact chris@nicofe.com



Nicofe Materials

Unit 8D, Torr View, Torr Quarry Industrial Estate, East Allington, Totnes TQ9 7QQ

01548 858770 | sales@nicofe.com | www.nicofe.com