

CarTech® MagneDur® 20-4 Alloy

Type Analysis

Single figures are nominal except where noted.

Carbon	0.01 %	Manganese	0.30 %
Silicon	0.20 %	Nickel	20.00 %
Molybdenum	4.00 %	Iron	Balance

General Information

Description

CarTech MagneDur 20-4 alloy is a cobalt-free alloy with semihard magnetic properties.

It is malleable and ductile, lending itself to the manufacture of strip, foil, and wire.

Applications

CarTech MagneDur 20-4 alloy has been used in theft detection tags. This alloy could also be considered for applications in instruments and hysteresis motors.

Properties

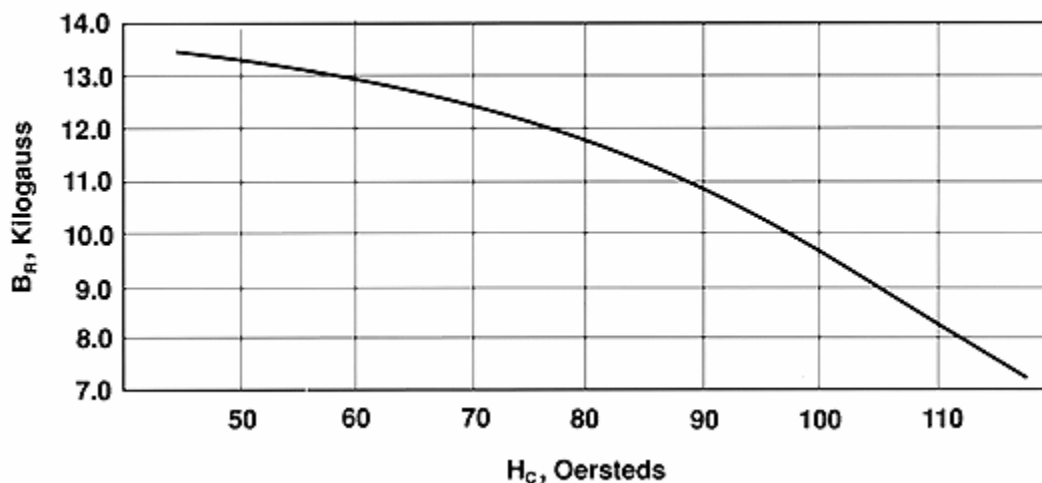
Physical Properties

Specific Gravity	8.07
Density	0.2920 lb/in ³
Mean CTE	
77 to 212°F	7.22 x 10 ⁻⁶ in/in/°F
77 to 572°F	7.78 x 10 ⁻⁶ in/in/°F
77 to 932°F	7.78 x 10 ⁻⁶ in/in/°F
Electrical Resistivity (73°F)	312.9 ohm-cir-mil/ft

Magnetic Properties

The curve displayed in the hyperlink entitled "Typical DC Magnetic Properties" shows combinations of remanence, B_r, and coercivity, H_c, that can be achieved in the rolling direction by varying the processing of MagneDur 20-4 alloy. Typical energy products are near 0.3 MGOe. H_c, B_r, and hysteresis loop squareness are significantly lower in the transverse direction. As H_c rises, the loops become rounder and the properties become less anisotropic.

Typical DC Magnetic Properties—MagneDur 20-4 Alloy



Typical Mechanical Properties

The strength of MagneDur 20-4 alloy depends on the processing. Yield strength can range from 100 kpsi (689 MPa) to 225 kpsi (1550 MPa) and ultimate strength from 180 kpsi (1240 MPa) to 250 kpsi (1723 MPa). The alloy is reasonably tough and workable in all condition.

Heat Treatment

MagneDur 20-4 alloy is usually produced to a magnetic property specification. Any heat treatment will change the properties. Customers considering heat treatment should contact Carpenter.

Workability

Ductility and a low work-hardening rate make MagneDur 20-4 alloy easy to cut, shear, slit, blank, machine, or grind. Limited bending, drawing, coining, and stamping are possible but change the magnetic properties. Welding or hot working ruin the magnetic properties. Photoetching can be done with sodium persulfate or ammonium persulfate solutions.

Other Information

Forms Manufactured

- Strip
- Wire

Technical Articles

- [Retail Theft Detection Devices and the Alloys That Make Them Work](#)

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