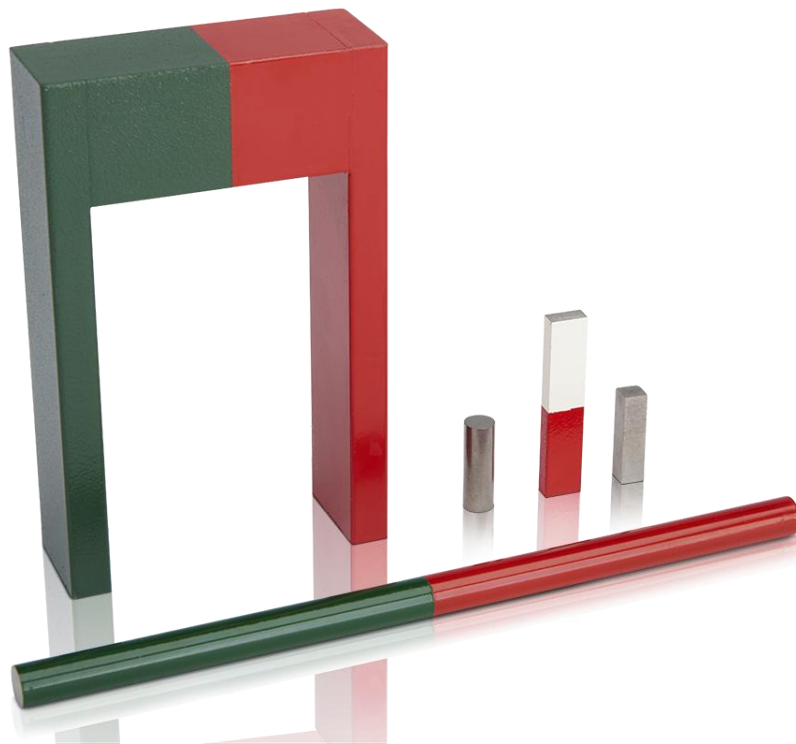


GUK Magnetics AlNiCo Grade System

This document provides magnetic, physical and mechanical data of all the aluminium-nickel-cobalt (AlNiCo) magnets GUK Magnetics sells, and which are relevant for the selection of magnets and design of magnetic systems.



AlNiCo Grades

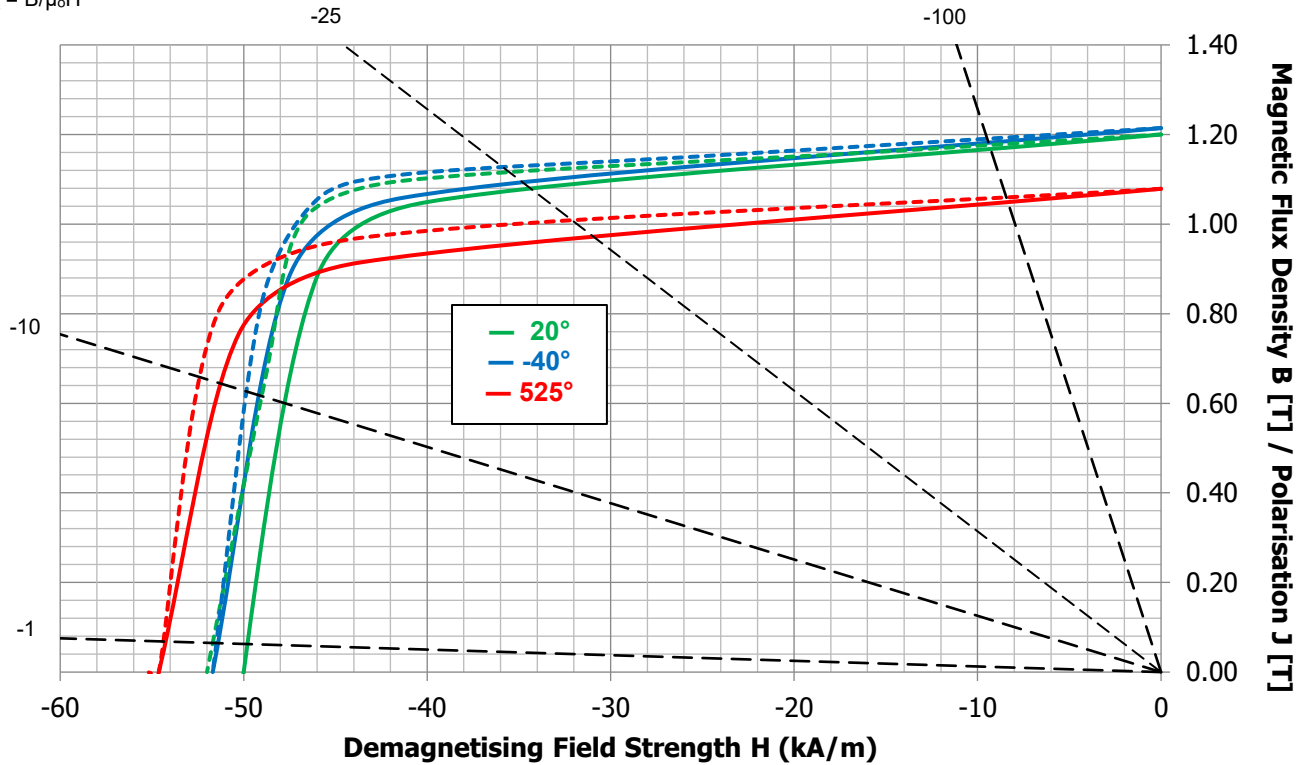
GUK Magnetics Grade Code	Production Type	Remanence B_r	Normal Coercivity H_{cB}	Intrinsic Coercivity H_{cJ}	Maximum Energy Product $(BH)_{max}$	Remanence Temperature coefficient $\alpha(B_r)$	Intrinsic Coercivity Temperature Coefficient $\beta(H_{cJ})$	Maximum Operating Temperature T_{max}
		Minimum Value	Minimum Value	Minimum Value	Minimum Value	Minimum Typical Value	Minimum Typical Value	Maximum Value
		[mT]	[kA/m]	[kA/m]	[kJ/m ³]	[%/°C]	[%/°C]	[°C]
<u>A5A</u>	Cast	1140	50	52	40	-0.020	0.010	525
<u>A5B</u>	Cast	1188	52	54	44	-0.020	0.010	525
<u>A6</u>	Cast	1235	56	58	52	-0.020	0.030	525
<u>A7</u>	Cast	1283	58	60	60	-0.020	0.030	525
<u>A8A</u>	Cast	760	110	112	38	-0.025	0.010	550
<u>A8B</u>	Cast	855	115	117	44	-0.025	0.010	550
<u>A9A</u>	Cast	950	110	112	60	-0.025	0.010	550
<u>A9B</u>	Cast	1026	120	122	80	-0.025	0.010	550
<u>AS5</u>	Sintered	1093	48	50	34	-0.020	0.010	525
<u>AS6</u>	Sintered	1045	58	60	28	-0.020	0.030	525
<u>AS8</u>	Sintered	760	110	112	38	-0.025	0.010	550

These are the most common grades. Please contact us for questions on other grades available at GUK Magnetics.

Technical Datasheet: AlNiCo A5A – Cast

Demagnetisation Curve A5A

$P_c = B/\mu_0 H$



Solid lines represent magnetic flux densities. Dashed lines represent polarisations. The curves here are estimates obtained from data available from the current GUK Magnetics grade system (Available on the website. See also the magnetic properties below). On request, actual measurements of demagnetisation curves can be obtained. For that, contact us on the address below.

Magnetic Properties @20°C			
B_r	min	1.20	T
H_{cb}	min	50	kA/m
H_{cj}	min	52	kA/m
(BH)_{ma}	min	40	kJ/m ³
α(B_r)	min typ	-0.020	%/°C
β(H_{cj})	min typ	0.010	%/°C
T_{max}		525	°C
μ_r	typ	2.0–3.0	-

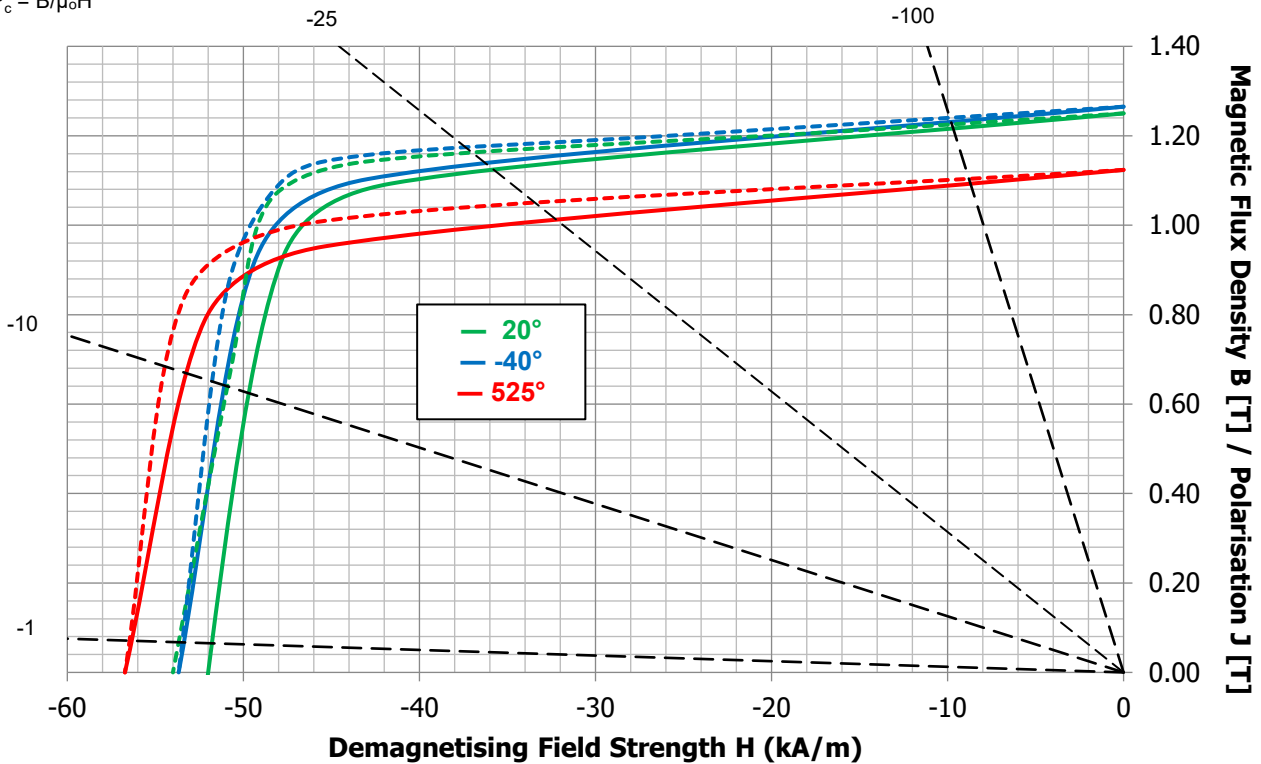
Physical & Mechanical Properties @20°C			
Density	typ	6900 - 7300	kg/m ³
Vickers Hardness	typ	440 - 700	HV
Modulus of Elasticity / Young's modulus	typ	100 - 200	GPa
Flexural / bending strength	typ	48 - 310	MPa
Compressive strength	typ	300 - 400	MPa
Tensile strength / ultimate strength	typ	20 - 160	MPa
Electrical resistivity	typ	0.45-0.75	μΩm
Specific heat capacity	typ	400 - 460	J/(kg K)
Thermal conductivity	typ	10 - 100	W/(m K)
Coefficient of linear thermal expansion, DOM*	typ	11 - 14	10 ⁻⁶ /K
Coefficient of linear thermal expansion, ⊥ DOM*	typ	11 - 14	10 ⁻⁶ /K

* DOM = Direction Of Magnetisation

Technical Datasheet: AlNiCo A5B – Cast

Demagnetisation Curve A5B

$P_c = B/\mu_0 H$



Solid lines represent magnetic flux densities. Dashed lines represent polarisations. The curves here are estimates obtained from data available from the current GUK Magnetics grade system (Available on the website. See also the magnetic properties below). On request, actual measurements of demagnetisation curves can be obtained. For that, contact us on the address below.

Magnetic Properties @20°C			
B_r	min	1.25	T
H_{cB}	min	52	kA/m
H_{cJ}	min	54	kA/m
(BH)_{ma}	min	44	kJ/m ³
α(B_r)	min typ	-0.020	%/°C
β(H_{cJ})	min typ	0.010	%/°C
T_{max}		525	°C
μ_r	typ	2.0–3.0	-

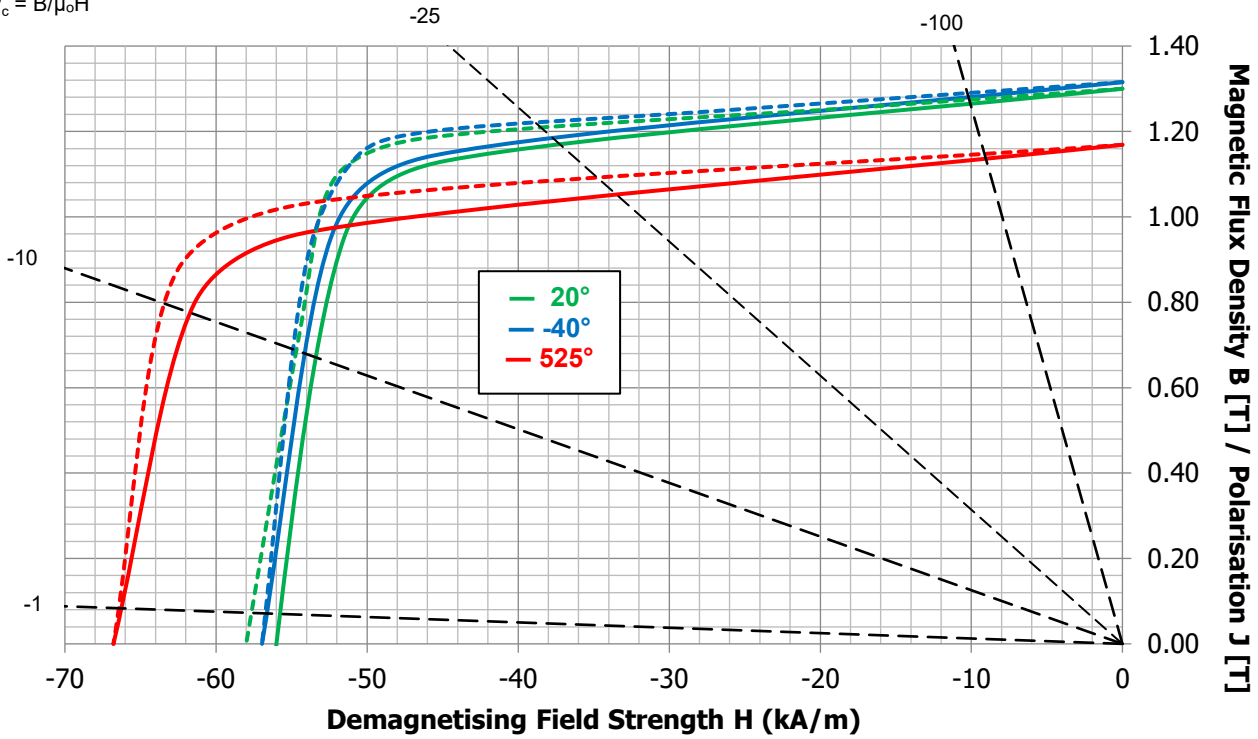
Physical & Mechanical Properties @20°C			
Density	typ	6900 - 7300	kg/m ³
Vickers Hardness	typ	440 - 700	HV
Modulus of Elasticity / Young's modulus	typ	100 - 200	GPa
Flexural / bending strength	typ	48 - 310	MPa
Compressive strength	typ	300 - 400	MPa
Tensile strength / ultimate strength	typ	20 - 160	MPa
Electrical resistivity	typ	0.45-0.75	μΩm
Specific heat capacity	typ	400 - 460	J/(kg K)
Thermal conductivity	typ	10 - 100	W/(m K)
Coefficient of linear thermal expansion, DOM*	typ	11 - 14	10 ⁻⁶ /K
Coefficient of linear thermal expansion, ⊥ DOM*	typ	11 - 14	10 ⁻⁶ /K

* DOM = Direction Of Magnetisation

Technical Datasheet: AlNiCo A6 – Cast

Demagnetisation Curve A6

$P_c = B/\mu_0 H$



Solid lines represent magnetic flux densities. Dashed lines represent polarisations. The curves here are estimates obtained from data available from the current GUK Magnetics grade system (Available on the website. See also the magnetic properties below). On request, actual measurements of demagnetisation curves can be obtained. For that, contact us on the address below.

Magnetic Properties @20°C			
B_r	min	1.30	T
H_{cB}	min	56	kA/m
H_{cJ}	min	58	kA/m
(BH)_{ma}	min	52	kJ/m ³
α(B_r)	min typ	-0.020	%/°C
β(H_{cJ})	min typ	0.030	%/°C
T_{max}		525	°C
μ_r	typ	2.0–3.0	-

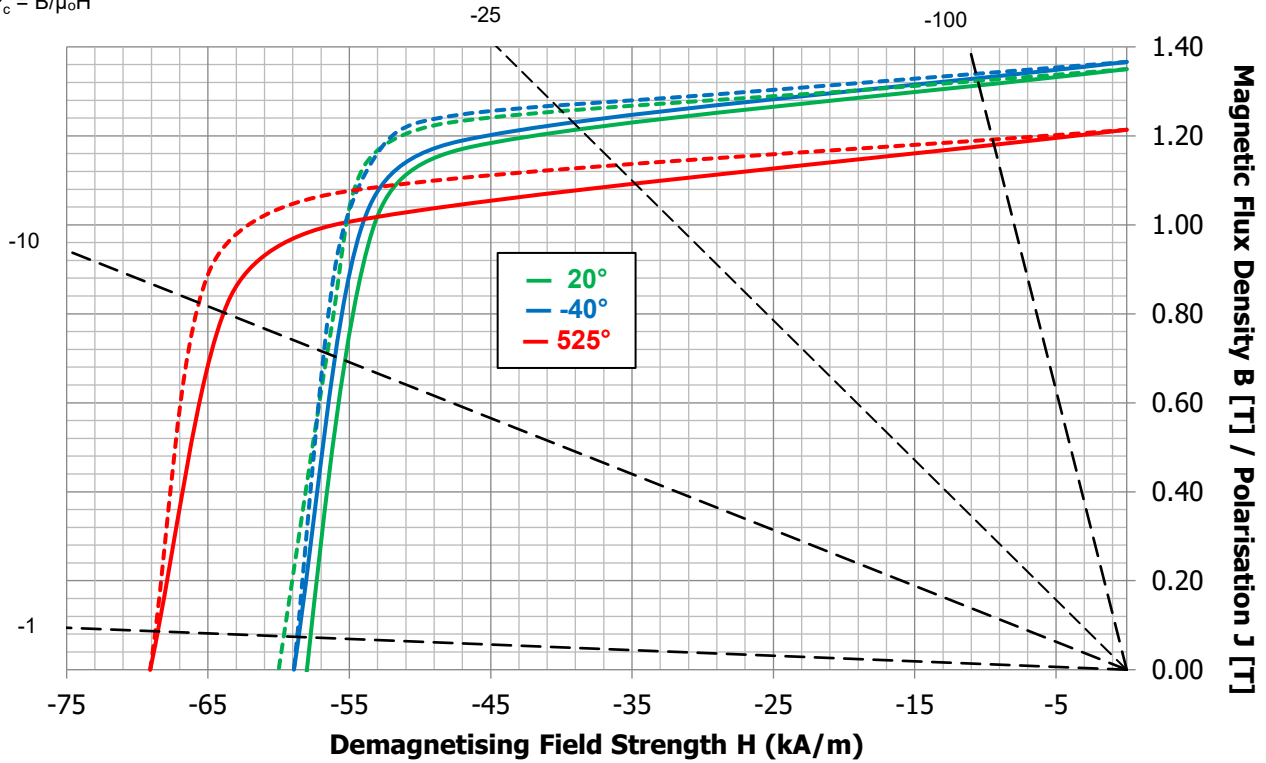
Physical & Mechanical Properties @20°C			
Density	typ	6900 - 7300	kg/m ³
Vickers Hardness	typ	440 - 700	HV
Modulus of Elasticity / Young's modulus	typ	100 - 200	GPa
Flexural / bending strength	typ	48 - 310	MPa
Compressive strength	typ	300 - 400	MPa
Tensile strength / ultimate strength	typ	20 - 160	MPa
Electrical resistivity	typ	0.45-0.75	μΩm
Specific heat capacity	typ	400 - 460	J/(kg K)
Thermal conductivity	typ	10 - 100	W/(m K)
Coefficient of linear thermal expansion, DOM*	typ	11 - 14	10 ⁻⁶ /K
Coefficient of linear thermal expansion, ⊥ DOM*	typ	11 - 14	10 ⁻⁶ /K

* DOM = Direction Of Magnetisation

Technical Datasheet: AlNiCo A7 – Cast

Demagnetisation Curve A7

$P_c = B/\mu_0 H$



Solid lines represent magnetic flux densities. Dashed lines represent polarisations. The curves here are estimates obtained from data available from the current GUK Magnetics grade system (Available on the website. See also the magnetic properties below). On request, actual measurements of demagnetisation curves can be obtained. For that, contact us on the address below.

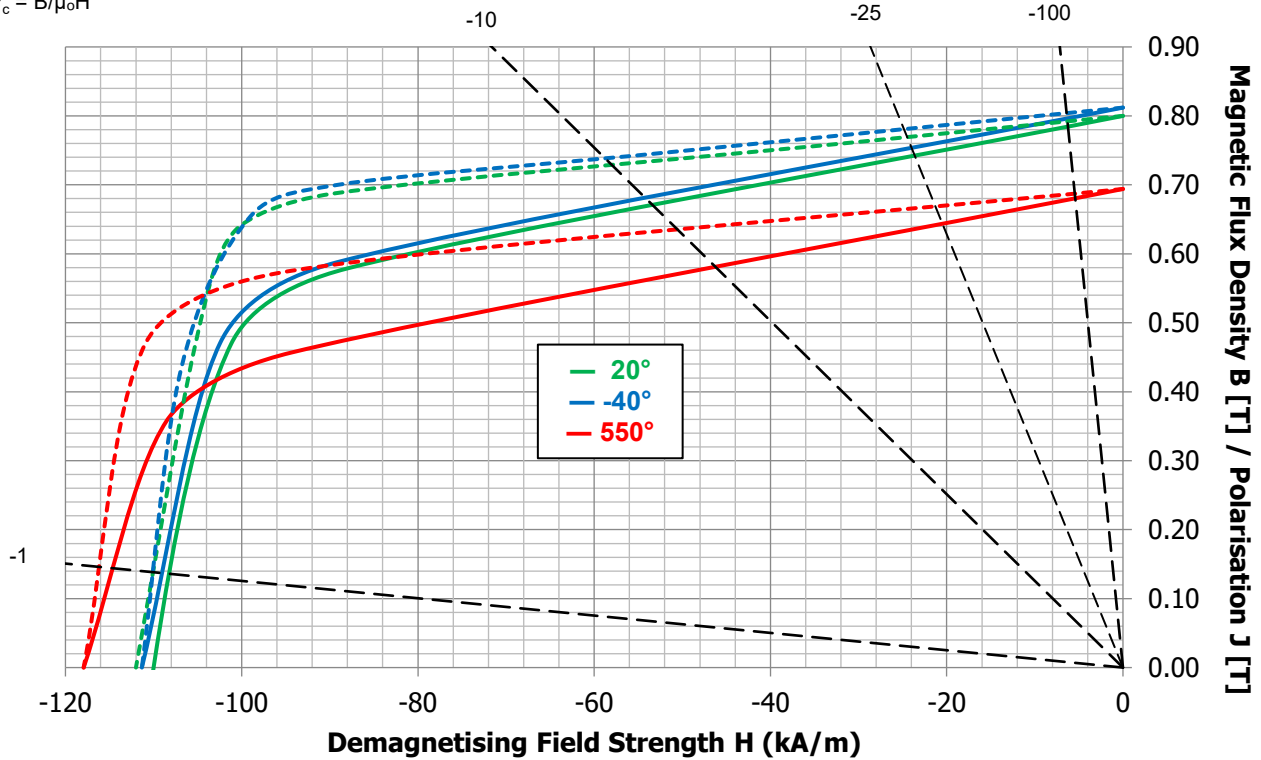
Magnetic Properties @20°C				Physical & Mechanical Properties @20°C			
B_r	min	1.35	T	Density	typ	6900 - 7300	kg/m ³
H_{cB}	min	58	kA/m	Vickers Hardness	typ	440 - 700	HV
H_{cJ}	min	60	kA/m	Modulus of Elasticity / Young's modulus	typ	100 - 200	GPa
(BH)_{ma}	min	60	kJ/m ³	Flexural / bending strength	typ	48 - 310	MPa
α(B_r)	min typ	-0.020	%/°C	Compressive strength	typ	300 - 400	MPa
β(H_{cJ})	min typ	0.030	%/°C	Tensile strength / ultimate strength	typ	20 - 160	MPa
T_{max}		525	°C	Electrical resistivity	typ	0.45-0.75	μΩm
μ_r	typ	2.0-3.0	-	Specific heat capacity	typ	400 - 460	J/(kg K)
				Thermal conductivity	typ	10 - 100	W/(m K)
				Coefficient of linear thermal expansion, DOM*	typ	11 - 14	10 ⁻⁶ /K
				Coefficient of linear thermal expansion, ⊥ DOM*	typ	11 - 14	10 ⁻⁶ /K

* DOM = Direction Of Magnetisation

Technical Datasheet: AlNiCo A8A – Cast

Demagnetisation Curve A8A

$P_c = B/\mu_0 H$



Solid lines represent magnetic flux densities. Dashed lines represent polarisations. The curves here are estimates obtained from data available from the current GUK Magnetics grade system (Available on the website. See also the magnetic properties below). On request, actual measurements of demagnetisation curves can be obtained. For that, contact us on the address below.

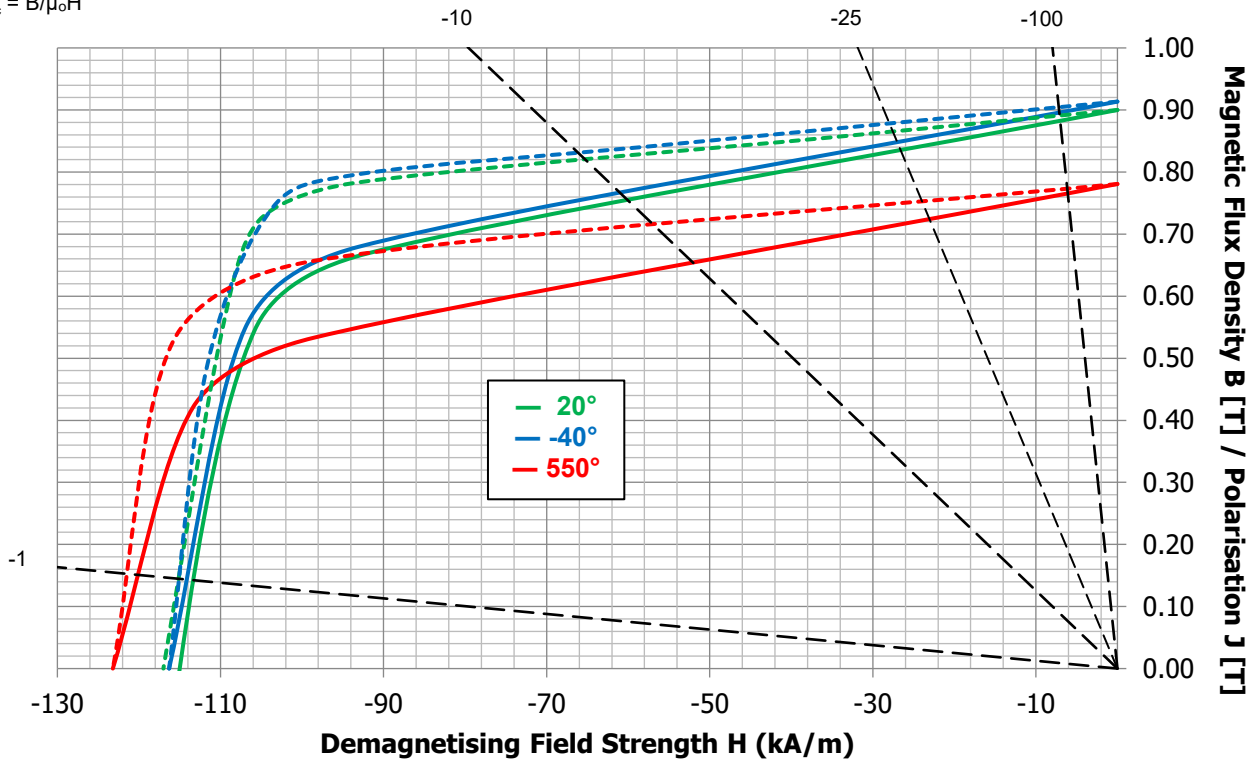
Magnetic Properties @20°C				Physical & Mechanical Properties @20°C			
B_r	min	0.80	T	Density	typ	6900 - 7300	kg/m ³
H_{cB}	min	110	kA/m	Vickers Hardness	typ	440 - 700	HV
H_{cJ}	min	112	kA/m	Modulus of Elasticity / Young's modulus	typ	100 - 200	GPa
(BH)_{ma}	min	38	kJ/m ³	Flexural / bending strength	typ	48 - 310	MPa
α(B_r)	min typ	-0.025	%/°C	Compressive strength	typ	300 - 400	MPa
β(H_{cJ})	min typ	0.010	%/°C	Tensile strength / ultimate strength	typ	20 - 160	MPa
T_{max}		550	°C	Electrical resistivity	typ	0.45-0.75	μΩm
μ_r	typ	2.0-3.0	-	Specific heat capacity	typ	400 - 460	J/(kg K)
				Thermal conductivity	typ	10 - 100	W/(m K)
				Coefficient of linear thermal expansion, DOM*	typ	11 - 14	10 ⁻⁶ /K
				Coefficient of linear thermal expansion, ⊥ DOM*	typ	11 - 14	10 ⁻⁶ /K

* DOM = Direction Of Magnetisation

Technical datasheet: AlNiCo A8B – Cast

Demagnetisation Curve A8B

$P_c = B/\mu_0 H$



Solid lines represent magnetic flux densities. Dashed lines represent polarisations. The curves here are estimates obtained from data available from the current GUK Magnetics grade system (Available on the website. See also the magnetic properties below). On request, actual measurements of demagnetisation curves can be obtained. For that, contact us on the address below.

Magnetic Properties @20°C			
B_r	min	0.90	T
H_{cb}	min	115	kA/m
H_{cj}	min	117	kA/m
(BH)_{ma}	min	44	kJ/m ³
α(B_r)	min typ	-0.025	%/°C
β(H_{cj})	min typ	0.010	%/°C
T_{max}		550	°C
μ_r	typ	2.0–3.0	-

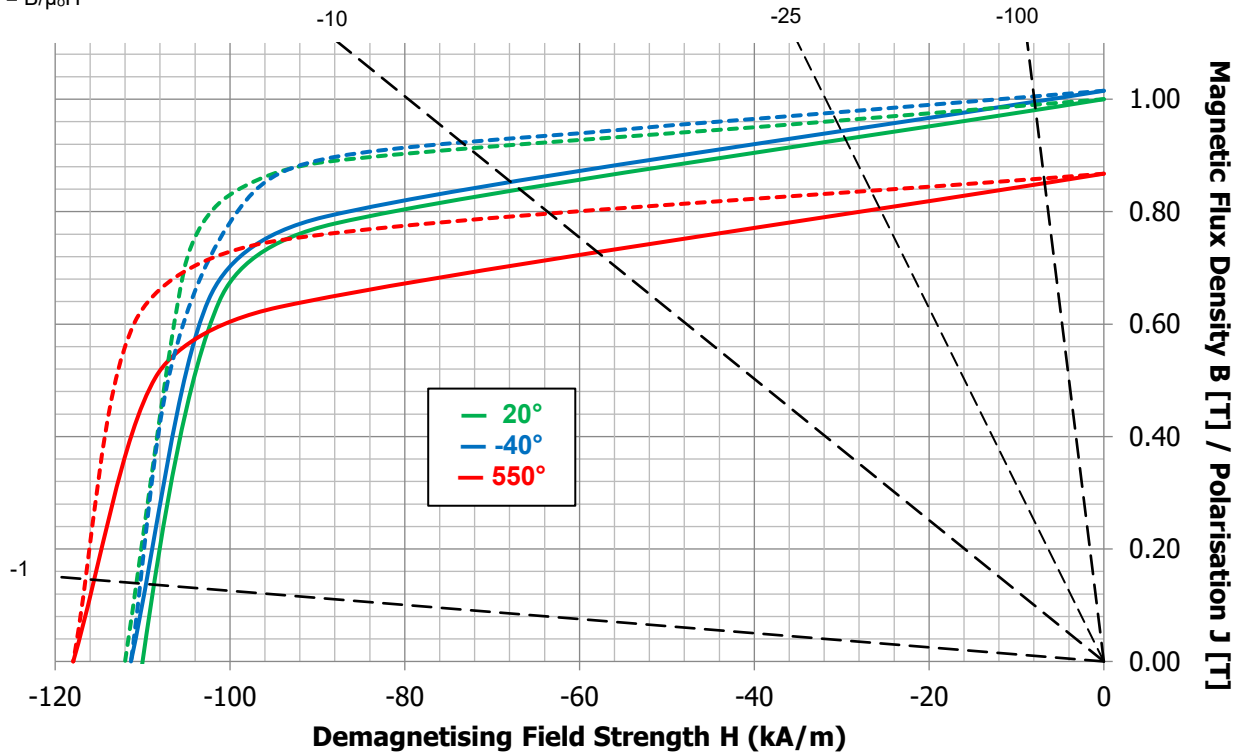
Physical & Mechanical Properties @20°C			
Density	typ	6900 - 7300	kg/m ³
Vickers Hardness	typ	440 - 700	HV
Modulus of Elasticity / Young's modulus	typ	100 - 200	GPa
Flexural / bending strength	typ	48 - 310	MPa
Compressive strength	typ	300 - 400	MPa
Tensile strength / ultimate strength	typ	20 - 160	MPa
Electrical resistivity	typ	0.45-0.75	μΩm
Specific heat capacity	typ	400 - 460	J/(kg K)
Thermal conductivity	typ	10 - 100	W/(m K)
Coefficient of linear thermal expansion, DOM*	typ	11 - 14	10 ⁻⁶ /K
Coefficient of linear thermal expansion, ⊥ DOM*	typ	11 - 14	10 ⁻⁶ /K

* DOM = Direction Of Magnetisation

Technical Datasheet: AlNiCo A9A – Cast

Demagnetisation curve A9A

$P_c = B/\mu_0 H$



Solid lines represent magnetic flux densities. Dashed lines represent polarisations. The curves here are estimates obtained from data available from the current GUK Magnetics grade system (Available on the website. See also the magnetic properties below). On request, actual measurements of demagnetisation curves can be obtained. For that, contact us on the address below.

Magnetic Properties @20°C			
B_r	min	1.00	T
H_{cB}	min	110	kA/m
H_{cJ}	min	112	kA/m
(BH)_{ma}	min	60	kJ/m ³
α(B_r)	min typ	-0.025	%/°C
β(H_{cJ})	min typ	0.010	%/°C
T_{max}		550	°C
μ_r	typ	2.0–3.0	-

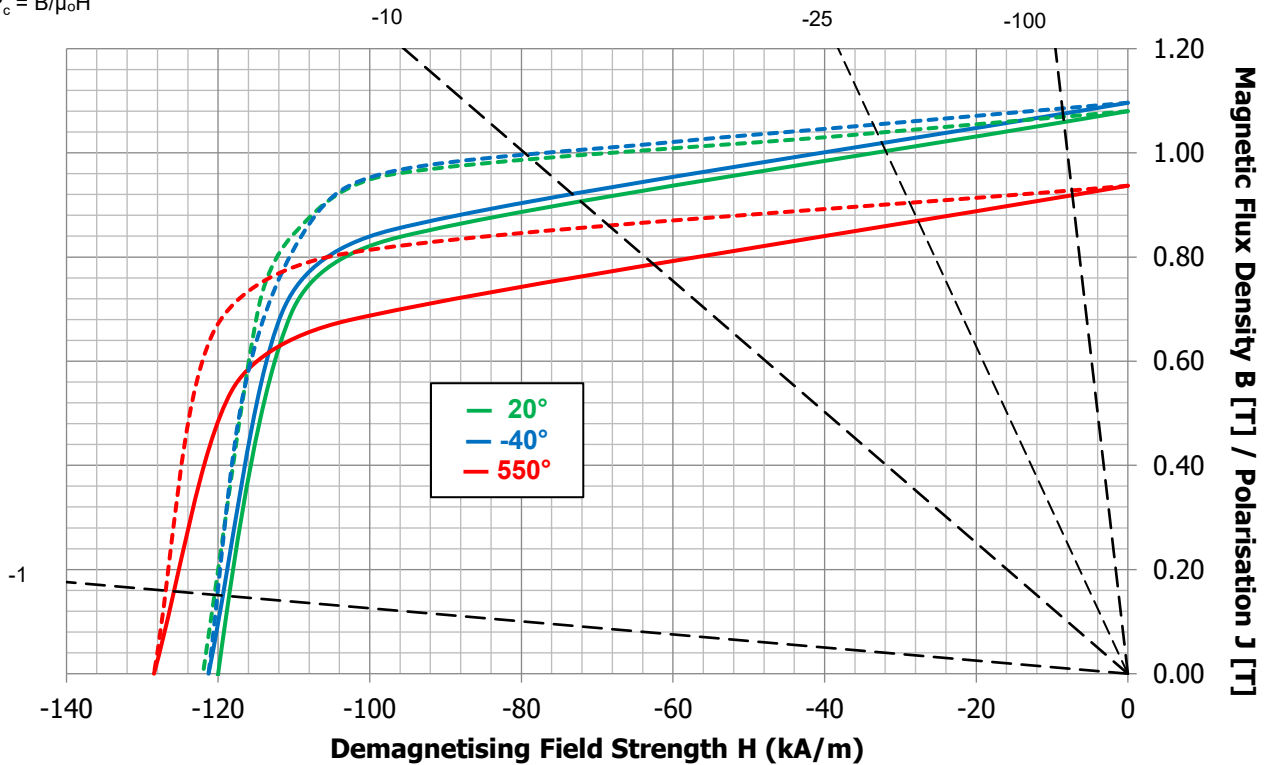
Physical & Mechanical Properties @20°C			
Density	typ	6900 - 7300	kg/m ³
Vickers Hardness	typ	440 - 700	HV
Modulus of Elasticity / Young's modulus	typ	100 – 200	GPa
Flexural / bending strength	typ	48 - 310	MPa
Compressive strength	typ	300 - 400	MPa
Tensile strength / ultimate strength	typ	20 - 160	MPa
Electrical resistivity	typ	0.45-0.75	μΩm
Specific heat capacity	typ	400 - 460	J/(kg K)
Thermal conductivity	typ	10 - 100	W/(m K)
Coefficient of linear thermal expansion, DOM*	typ	11 - 14	10 ⁻⁶ /K
Coefficient of linear thermal expansion, ⊥ DOM*	typ	11 - 14	10 ⁻⁶ /K

* DOM = Direction Of Magnetisation

Technical Datasheet: AlNiCo A9B – Cast

Demagnetisation curve A9B

$P_c = B/\mu_0 H$



Solid lines represent magnetic flux densities. Dashed lines represent polarisations. The curves here are estimates obtained from data available from the current GUK Magnetics grade system (Available on the website. See also the magnetic properties below). On request, actual measurements of demagnetisation curves can be obtained. For that, contact us on the address below.

Magnetic Properties @20°C			
B_r	min	1.08	T
H_{cB}	min	120	kA/m
H_{cJ}	min	122	kA/m
(BH)_{ma}	min	80	kJ/m ³
α(B_r)	min typ	-0.025	%/°C
β(H_{cJ})	min typ	0.010	%/°C
T_{max}		550	°C
μ_r	typ	2.0–3.0	-

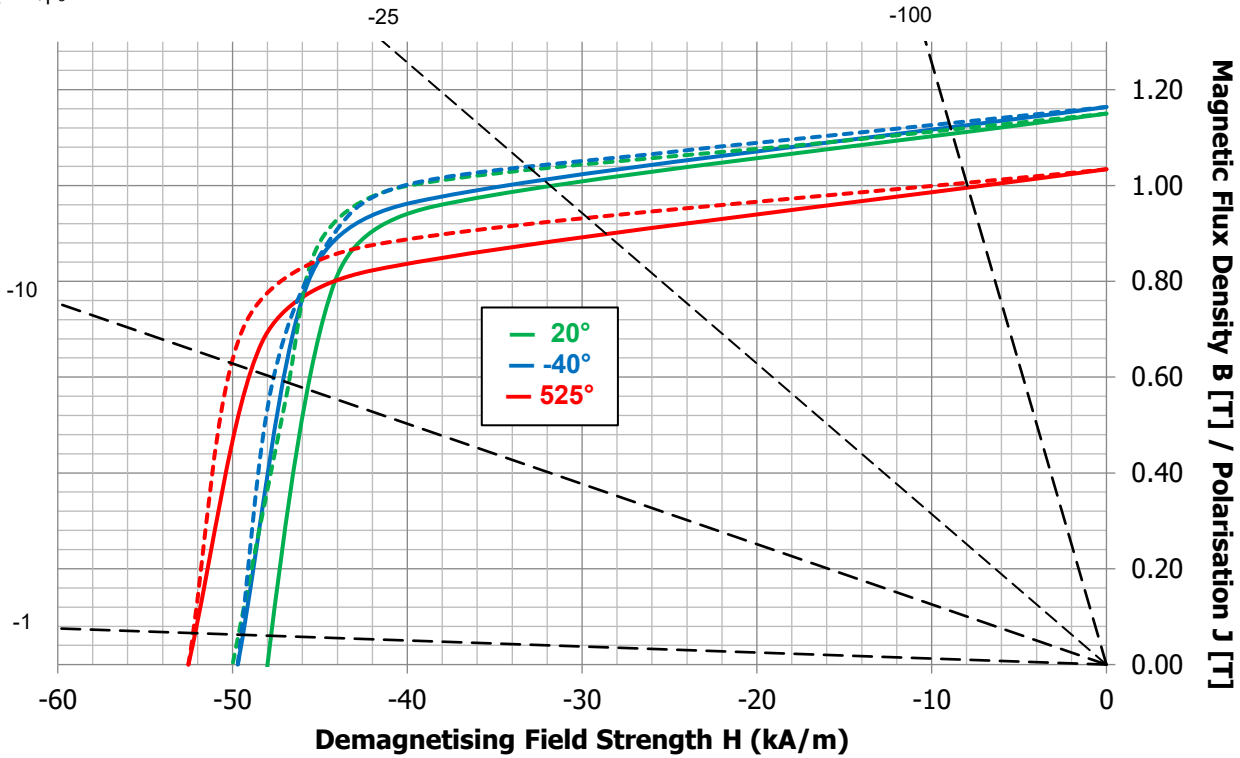
Physical & Mechanical Properties @20°C			
Density	typ	6900 - 7300	kg/m ³
Vickers Hardness	typ	440 - 700	HV
Modulus of Elasticity / Young's modulus	typ	100 – 200	GPa
Flexural / bending strength	typ	48 - 310	MPa
Compressive strength	typ	300 - 400	MPa
Tensile strength / ultimate strength	typ	20 - 160	MPa
Electrical resistivity	typ	0.45-0.75	μΩm
Specific heat capacity	typ	400 - 460	J/(kg K)
Thermal conductivity	typ	10 - 100	W/(m K)
Coefficient of linear thermal expansion, DOM*	typ	11 - 14	10 ⁻⁶ /K
Coefficient of linear thermal expansion, ⊥ DOM*	typ	11 - 14	10 ⁻⁶ /K

* DOM = Direction Of Magnetisation

Technical Datasheet: AlNiCo AS5 – Sintered

Demagnetisation Curve AS5

$P_c = B/\mu_0 H$



Solid lines represent magnetic flux densities. Dashed lines represent polarisations. The curves here are estimates obtained from data available from the current GUK Magnetics grade system (Available on the website. See also the magnetic properties below). On request, actual measurements of demagnetisation curves can be obtained. For that, contact us on the address below.

Magnetic Properties @20°C			
B_r	min	1.15	T
H_{cB}	min	48	kA/m
H_{cJ}	min	50	kA/m
(BH)_{ma}	min	34	kJ/m ³
α(B_r)	min typ	-0.020	%/°C
β(H_{cJ})	min typ	0.010	%/°C
T_{max}		525	°C
μ_r	typ	3.0–4.5	-

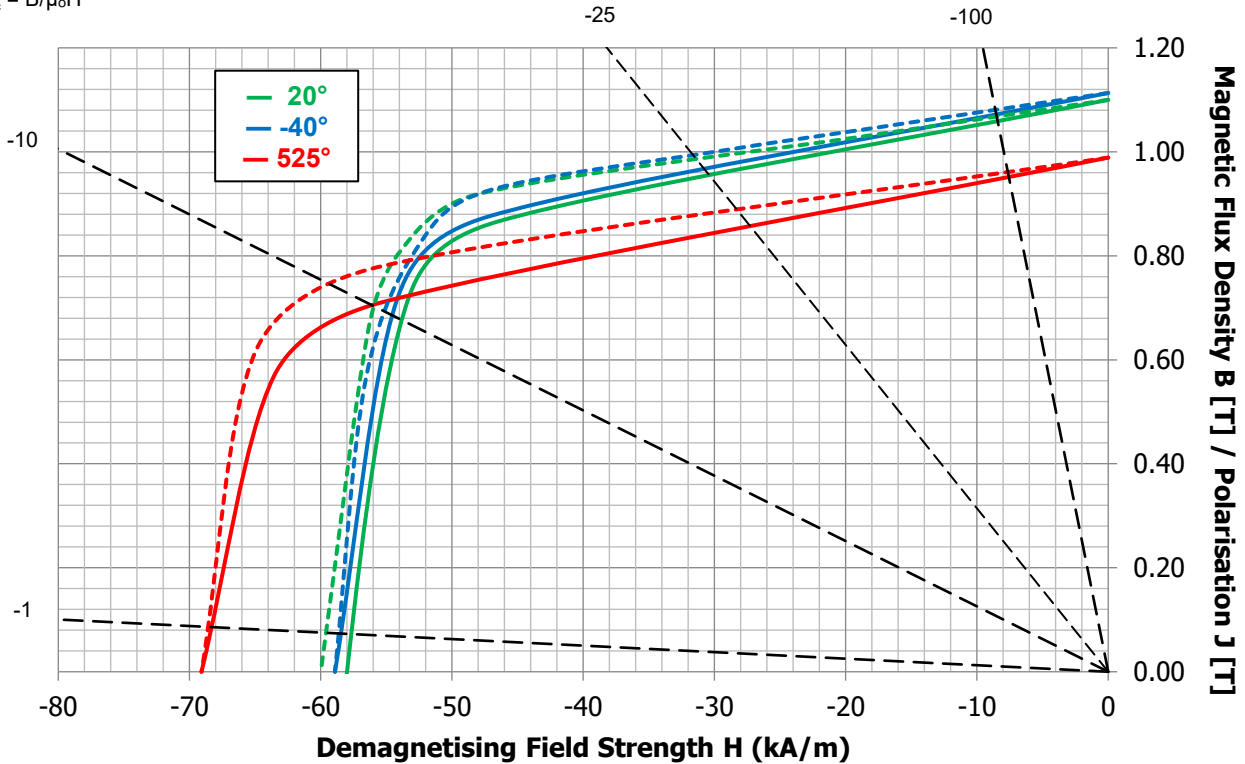
Physical & Mechanical Properties @20°C			
Density	typ	6800 - 7300	kg/m ³
Vickers Hardness	typ	300 - 700	HV
Modulus of Elasticity / Young's modulus	typ	100 - 200	GPa
Flexural / bending strength	typ	80 - 760	MPa
Compressive strength	typ	300 - 400	MPa
Tensile strength / ultimate strength	typ	80 - 450	MPa
Electrical resistivity	typ	0.40-0.70	μΩm
Specific heat capacity	typ	350 - 500	J/(kg K)
Thermal conductivity	typ	10 - 200	W/(m K)
Coefficient of linear thermal expansion, DOM*	typ	11 - 14	10 ⁻⁶ /K
Coefficient of linear thermal expansion, ⊥ DOM*	typ	10 - 14	10 ⁻⁶ /K

* DOM = Direction Of Magnetisation

Technical Datasheet: AlNiCo AS6 – Sintered

Demagnetisation Curve AS6

$P_c = B/\mu_0 H$



Solid lines represent magnetic flux densities. Dashed lines represent polarisations. The curves here are estimates obtained from data available from the current GUK Magnetics grade system (Available on the website. See also the magnetic properties below). On request, actual measurements of demagnetisation curves can be obtained. For that, contact us on the address below.

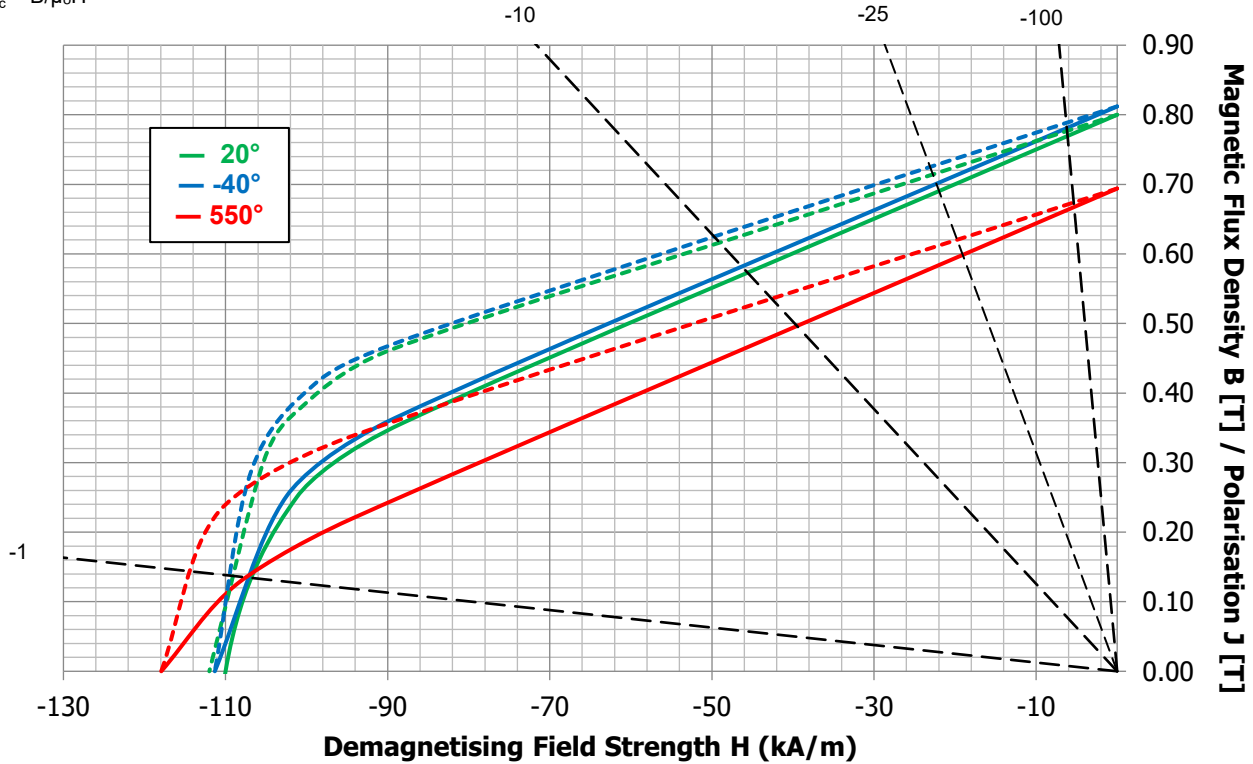
Magnetic Properties @20°C				Physical & Mechanical Properties @20°C			
B_r	min	1.10	T	Density	typ	6800 - 7300	kg/m ³
H_{cB}	min	58	kA/m	Vickers Hardness	typ	300 - 700	HV
H_{cJ}	min	60	kA/m	Modulus of Elasticity / Young's modulus	typ	100 - 200	GPa
(BH)_{ma}	min	28	kJ/m ³	Flexural / bending strength	typ	80 - 760	MPa
α(B_r)	min typ	-0.020	%/°C	Compressive strength	typ	300 - 400	MPa
β(H_{cJ})	min typ	0.030	%/°C	Tensile strength / ultimate strength	typ	80 - 450	MPa
T_{max}		525	°C	Electrical resistivity	typ	0.40-0.70	μΩm
μ_r	typ	3.0-4.5	-	Specific heat capacity	typ	350 - 500	J/(kg K)
				Thermal conductivity	typ	10 - 200	W/(m K)
				Coefficient of linear thermal expansion, DOM*	typ	11 - 14	10 ⁻⁶ /K
				Coefficient of linear thermal expansion, ⊥ DOM*	typ	10 - 14	10 ⁻⁶ /K

* DOM = Direction Of Magnetisation

Technical Datasheet: AlNiCo AS8 – Sintered

Demagnetisation Curve AS8

$P_c = B/\mu_0 H$

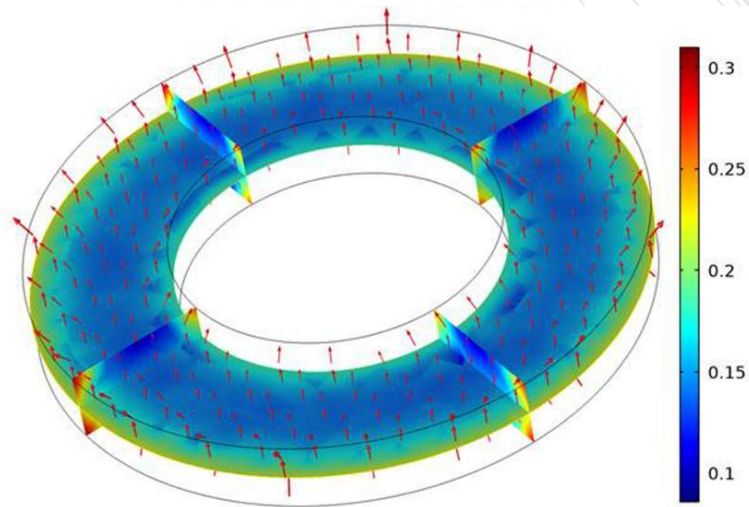


Solid lines represent magnetic flux densities. Dashed lines represent polarisations. The curves here are estimates obtained from data available from the current GUK Magnetics grade system (Available on the website. See also the magnetic properties below). On request, actual measurements of demagnetisation curves can be obtained. For that, contact us on the address below.

Magnetic Properties @20°C			
B_r	min	0.80	T
H_{cB}	min	110	kA/m
H_{cJ}	min	112	kA/m
(BH)_{ma}	min	38	kJ/m ³
α(B_r)	min typ	-0.025	%/°C
β(H_{cJ})	min typ	0.010	%/°C
T_{max}		550	°C
μ_r	typ	3.0–4.5	-

Physical & Mechanical Properties @20°C			
Density	typ	6800 - 7300	kg/m ³
Vickers Hardness	typ	300 - 700	HV
Modulus of Elasticity / Young's modulus	typ	100 - 200	GPa
Flexural / bending strength	typ	80 - 760	MPa
Compressive strength	typ	300 - 400	MPa
Tensile strength / ultimate strength	typ	80 - 450	MPa
Electrical resistivity	typ	0.40-0.70	μΩm
Specific heat capacity	typ	350 - 500	J/(kg K)
Thermal conductivity	typ	10 - 200	W/(m K)
Coefficient of linear thermal expansion, DOM*	typ	11 - 14	10 ⁻⁶ /K
Coefficient of linear thermal expansion, ⊥ DOM*	typ	10 - 14	10 ⁻⁶ /K

* DOM = Direction Of Magnetisation



GUK Magnetics offers a wide range of services with regards to the design and selection of the appropriate magnet for your specific application. For instance, we apply magnet calculations and FEM simulations to quickly identify the best magnet for your product.

The possibilities with magnet technology are endless, which is why it can quickly become confusing. GUK Magnetics has more than 60 years of experience in the world of magnetism and is happy to help you with advice and a range of services:

- FEM simulation & magnet calculations: gain quick insight into the operation of your design.
- Prototyping & samples: tangible magnet technology based on your requirements.
- Engineering: development of magnet assemblies and components.
- Quality control: critical properties tested and validated in our own measurement lab.
- Stock management service: delivery of your magnets on demand through our modern warehouse.

You can choose whatever form of support you want. This guarantees you the right magnet for your specific application.