

**BB AUTOMACAO**  
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## **BB Automacao Alnico Magnets**

## **Aluminium-Nickel-Cobalt Magnets**

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## General Information



Alnico magnet material is an alloy of aluminium -nickel-cobalt with minor amounts of other elements such as titanium and copper. Alnico magnets are characterized by excellent temperature stability over a wide temperature range and high residual induction. They are candidate for continuous duty applications where temperature extreme up to 500°C can be expected.

However, the coercive force and maximum energy product are not high. They limit their applications in many cases. Casting and sintering are two major processes used to manufacture the Alnico magnets. Alnico magnets with complex shapes may be manufactured by casting.

## Material Information

- Production by casting or powder metallurgical techniques
- An alloy composed of matrix of Al-Ni-Fe-Co
- Excellent stability over a wide temperature range higher than 500°C
- Strong corrosion resistance capability without coating for surface protection
- Good resistance to demagnetization from vibration and shock
- Good flux density at a reasonable cost
- Very hard & brittle

## Typical Physical Properties

Curie Temperature (°C)	860
Maximum Operating Temperature (°C)	525-550
Resistivity ( $\mu$ ohm.cm)	47-54
Hardness (Hv)	520-630
Density (g/cm <sup>3</sup> )	6.90-7.30
Relative Recoil Permeability ( $\mu_{rec}$ )	1.70-4.70
Saturation Field Strength, kOe (kA/m)	2.7-6.3 (215-500)
Temperature Coefficient of Br (%/°C)	-0.025 ~ -0.02
Temperature Coefficient of iHc (%/°C)	+0.01 ~ +0.03

## Magnetic Properties of Alnico Magnets

### Magnetic Properties of Casted Alnico

Material Grade	Item	Remanence		Intrinsic Coercivity		Max. Energy Product	
		Br (mT)	Br (kGs)	iHc (kA/m)	iHc (kOe)	(BH)max (KJ/m <sup>3</sup> )	(BH)max (MGOe)
Alnico 3	*LN9	680	6.8	30	0.38	9.0	1.13
	*LN10	600	6.0	39.8	0.50	10.0	1.20
Alnico 2	*LNG12	720	7.2	39.8	0.5	12.4	1.55
	*LNG13	700	7.0	48.0	0.60	12.8	1.60
Alnico 5	LNG37	1200	12.0	48.0	0.60	37.0	4.65
	LNG40	1250	12.5	48.0	0.60	40.0	5.0
	LNG44	1250	12.5	52.0	0.65	44.0	5.5
Alnico 5DG	LNG52	1300	13.0	56.0	0.70	52.0	6.5
Alnico 5-7	LNG60	1350	13.5	59.0	0.74	60.0	7.5
Alnico 6	LNGT28	1000	10.0	58.0	0.72	28.0	3.5
Alnico 8HC	LNGT36J	700	7.0	140.0	1.75	36.0	4.5
Alnico 8	*LNGT18	580	5.8	100.0	1.25	18.0	2.2
Alnico 8	LNGT32	800	8.0	100.0	1.25	32.0	4.0
	LNGT40	800	8.0	110.0	1.38	40.0	5.0
Alnico 9	LNGT60	900	9.0	110.0	1.38	60.0	7.5
	LNGT75	1050	10.5	112.0	1.4	72.0	9.0

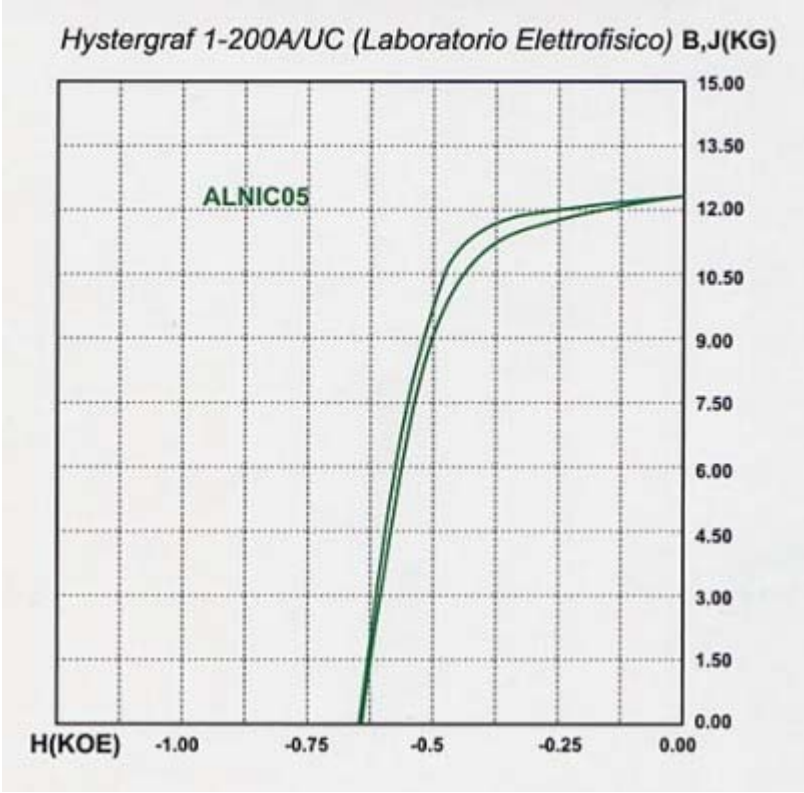
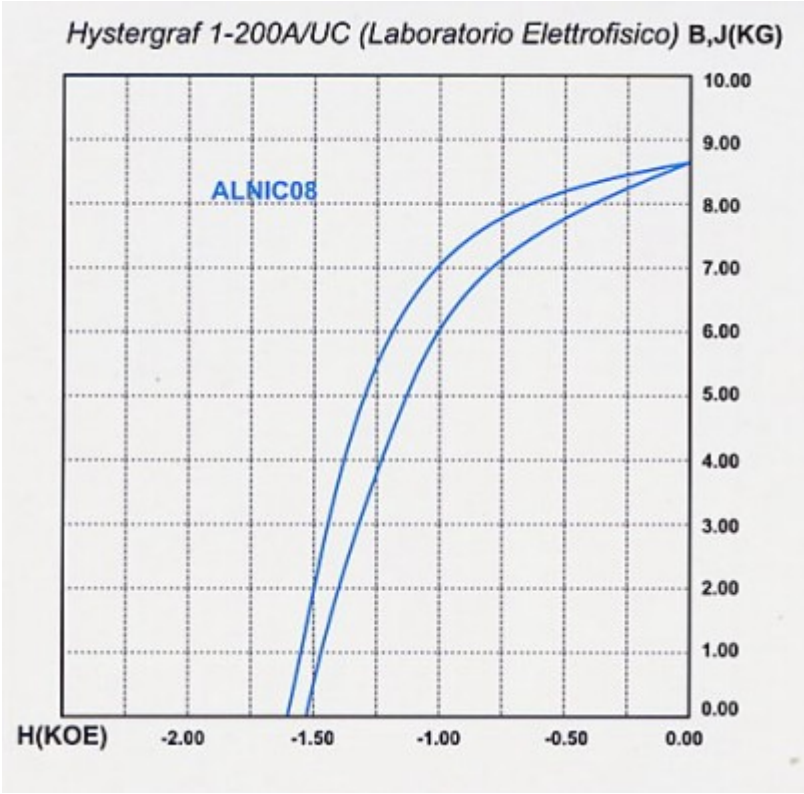
**Note: \* means isotropy**

### Magnetic Properties of Sintered Alnico

Material Grade	Remanence		Coercivity		Intrinsic Coercivity		Max. Energy Product	
	Br (mT)	Br (kGs)	bHc (kA/m)	bHc (kOe)	iHc (kA/m)	iHc (kOe)	(BH)max (KJ/m <sup>3</sup> )	(BH)max (MGOe)
*FLN8	520	5.2	40	0.5	43	0.54	8-10	1.0-1.25
*FLNG12	700	7.0	40	0.5	43	0.54	12-14	1.5-1.75
*FLNGT14	570	5.7	76	0.95	78	0.98	14-16	1.75-2.00
*FLNGT18	560	5.6	88	1.1	90	1.13	18-22	2.25-2.75
FLNG28	1050	10.5	46	0.58	47	0.59	28-33	3.5-4.15
FLNG34	1100	11.0	50	0.63	51	0.64	34-38	4.3-4.8
FLNGT28	1000	10.0	56	0.7	57	0.71	28-30	3.5-3.8
FLNGT31	780	7.8	104	1.3	90	1.13	31-36	3.9-4.5
FLNG33J	650	6.5	135	1.7	150	1.88	33-36	4.15-4.5
FLNGT38	800	8.0	123	1.55	126	1.58	38-42	4.75-5.3
FLNGT42	880	8.8	120	1.5	122	1.53	42-48	5.3-6.0

**Note: \* means isotropy**

# Typical Demagnetization Curves of Alnico Magnets (Aluminium-Nickel-Cobalt)



## Dimension Range / Nominal Tolerance

Ring Magnet	Outer Diameter (mm)	Inner Diameter (mm)	Thickness (mm)
Maximum	100	80	100
Minimum	4	2	5
Tolerance	±0.01	±0.01	±0.01

Block Magnet	Length (mm)	Width (mm)	Thickness (mm)
Maximum	100	80	50
Minimum	2	2	2
Tolerance	±0.01	±0.01	±0.01

Disc Magnet	Diameter (mm)	Thickness (mm)
Maximum	100	100
Minimum	2	2
Tolerance	±0.01	±0.01

Segment & other irregular shapes can be manufactured according to customer's sample or blue print

BB Automacao supplies various kinds of sintered and casted Alnico magnets (Aluminium-Nickel-Cobalt) in specific sizes and shapes according to the customers' requirements. It allows also its customers to customize characteristics of their magnets. The shapes can be discs, rings, blocks, slabs, cylinders, tiles and other specific shapes.



Sintered Alnico Magnets



Casted Cylinder Magnets

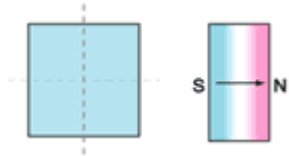


Casted Block Magnets

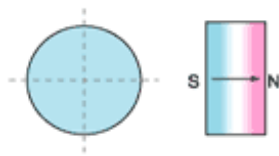


Casted Horseshoe Magnets

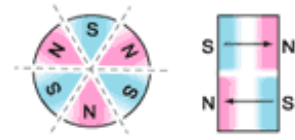
## Magnetization Directions of Permanent Magnets



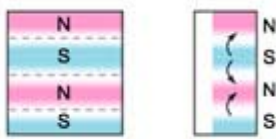
oriented through thickness



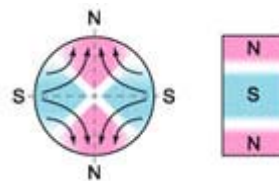
axially oriented



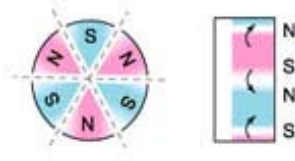
axially oriented in segments



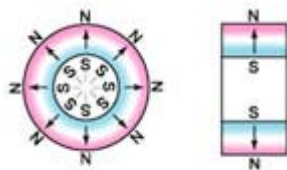
oriented laterally  
multipole on one face



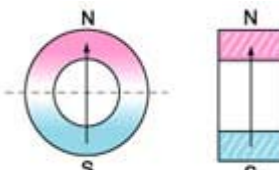
multipole oriented in segments  
on outside diameter\*



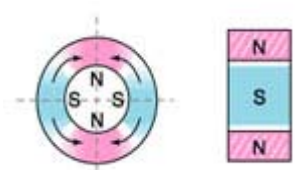
multipole oriented in segments  
on one face



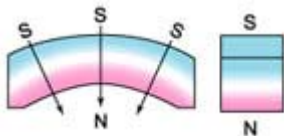
radially oriented \*



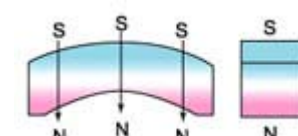
oriented through  
diameter \*



multipole oriented in segments  
on inside diameter\*



radially oriented



diametrical oriented

all available as isotropic or  
anisotropic material  
\* only available in isotropic  
and certain anisotropic  
materials only