

Alnico magnet

The AlNiCo magnets feature excellent temperature stability, high residual induction, and relatively high energies characterize Alnico materials, composed primarily of alloys of Aluminum, Nickel, and Cobalt. They are manufactured through either a casting or sintering process.

Key Benefits

1. Excellent temperature stability up to 1,000° F - 90% of room temperature magnetization is retained up to this temperature.
2. High residual induction - Alnico magnets can produce powerful fields in certain configurations.
3. Material does not corrode.
4. Cast Alnico magnets can be produced in relatively complex shapes.
5. Tooling for cast magnets is relatively low, since sand molds are generally used for the casting process.

Key Challenges

1. Alnico materials have low coercivities, meaning that they are easily demagnetized.
2. These magnets are relatively costly since they contain both nickel and cobalt.
3. Cast Alnicos often have casting pores and voids within them - which can be problematic from cosmetics point of view or because large voids may lower expected magnetic flux.
4. The material is extremely hard and brittle and difficult to machine.

Quick Facts

1. Density - 0.265 lbs per cubic inch
2. Saturation magnetizing field required - about 5kOe
3. Manufacturing methods - casting (most common), or sintering.
4. Shapes available - blocks, bars, discs, rings, horseshoes, etc.
5. Grades available - from about 0105 to 0519. (First 2 digits represent BHmax, and second two digits represent Intrinsic Coercivity, Hci.)

6. Sizes - off tool very large Alnico magnets can be cast (for example horseshoe magnets weighing 500 pounds), or small magnets sintered (for example sintered discs, 1/16" in diameter)

Magnetic Properties

Typical Magnetic Performance for Cast Alnico

Grade	Br		Hcj		(BH)max		US standard	IEC standard	Ger Stand
	KGs	mT	Oe	KA/m	KJ/m3	MGOe	MMPA Equivalent	IEC Equivalent	Ge
LN10	6.5	650	530	42	10.0	1.20	Alnico 3	Alnico 9/3	/
LNG11	7.2	720	480	37	11.2	1.40	Alnico 1	Alnico 8/4	Alnico 120
LNG13	7.0	700	620	50	13.0	1.60	Alnico 2	Alnico 12/6	Alnico 160
LNGT18	5.8	580	1250	100	18.0	2.20	I. Alnico 8	Alnico 17/9	/
LNG16	8.0	800	660	53	16.0	2.00	Alnico 4	/	/
LNG34	11.8	1180	550	44	34.0	4.25	Alnico 5C	/	/
LNG37	12.0	1200	600	48	37.0	4.65		Alnico 37/5	Alnico 500
LNG40	12.2	1220	630	50	40.0	5.00	Alnico 5	/	
LNG44	12.5	1250	650	52	44.0	5.50		Alnico 44/5	
LMG52	13.0	1300	690	55	52.0	6.50	Alnico 5DG	Alnico 52/6	Alnico 600.
LNG60	13.3	1330	750	60	60.0	7.50	Alnico 5-7	/	Alnico 700
LNGT28	10.5	1050	700	56	28.0	3.50	Alnico 6	Alnico 26/6	Alnico 400
LNGT30	10.5	1050	750	60	30.0	3.75		/	/
LNGT32	8.0	800	1280	102	32.0	4.00	Alnico 8	Alnico 38/11	Alnico 350
LNGT40	8.2	820	1400	112	40.0	5.00			
LNGT44	8.8	880	1540	123	44.0	5.50	Alnico 8B	/	Alnico 450

LNGT48A	9.3	930	1540	123	48.0	6.00	Alnico 8HE	/	/
LNGT48B	8.5	850	1650	132	48.0	6.00		/	/
LNGT60	9.0	900	1380	110	60.0	7.50		Alnico 60/11	/
LNGT72	10.5	1050	1410	112	72.0	9.00	Alnico 9	/	/
LNGT80	10.8	1080	1540	123	80.0	10.00		/	/
LNGT88	11.0	1100	1575	126	88.0	11.00		/	/
LNGT92	11.5	1150	1575	126	92.0	11.50		/	/
LNGT36J	7.0	700	1750	140	36.0	4.50	Alnico 8 HC	Alnico 36/15	/
LNGT40J	7.2	720	1900	152	40.0	5.00		/	/
LNGT44J	8.2	820	1800	144	44.0	5.50		Alnico 4415	/

Typical Magnetic Performance for Sintered Alnico

Grade	Br		Hcb		Hcj		(BH)max		Density	Remark
	KGs	mT	Oe	KA/m	Oe	KA/m	KJ/m3	MGOe	g/cm3	
FLN8	5.2	520	500	40	540	43	8-10	1.00-1.25	6.80	Isotropic
FLNG12	7.0	700	500	40	540	43	12-14	1.50-1.75	6.90	
FLNG14	5.7	570	950	76	980	78	14-16	1.75-2.00	6.90	
FLNG18	5.6	560	1100	88	1130	90	18-22	2.25-2.75	7.00	
FLNG28	10.5	1050	580	46	590	47	28-33	3.50-4.15	7.30	Anisotropic
FLNG34	11.0	1100	600	48	630	50	33-38	4.10-4.70	7.30	
FLNG35	12.2	1220	630	50	640	51	35-39	4.40-4.90	7.30	
FLNGT28	10.0	1000	700	56	710	57	28-30	3.50-3.80	7.30	
FLNGT31	7.8	780	1300	104	1130	106	33-26	3.90-4.50	7.30	
FLNGT38	8.0	800	1550	123	1580	126	38-42	4.75-5.30	7.30	
FLNGT42	8.8	880	1500	120	1530	122	42-44	5.30-5.50	7.30	
FLNGT44	9.0	900	1500	120	1560	125	44-48	5.50-6.00	7.30	
FLNG33J	6.5	650	1700	136	1880	150	31-36	4.10-4.50	7.30	
FLNGT40J	8.0	800	1800	1440	1950	155	40-44	5.00-5.50	7.30	
FLNGT44J	8.2	820	1900	1520	2000	160	44-48	5.50-6.00	7.30	

Physical Properties

Physical Properties of Cast AlNiCo

Curie Temperature T _c	860°C
Max Operating Temperature	525-550°C
Specific Resistance	47-54Ω-cm
Hardness	520-630
Recoil Permeability	1.70-4.70 Gs/Oe
Tem. Coefficient	-0.025 ~ -0.02%/C
Tem. Coefficient of Inturensic Coerrice Induction	+0.01 ~ +0.03/°C

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