

AlNiCo Magnets

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 The details can be found by referring to the appended individual delivery specifications. All specifications are subject to change without notice.

AlNiCo Magnets

Introduction

Alnico magnets deliver impressive flux density at an economical price. They boast the lowest reversible temperature coefficient of any commercial magnet materials allowing for excellent stability over a wide temperature range.



Alnico magnets are also inherently corrosion resistant. Besides commonly used areas like loudspeaker, sensor, magnetic chuck, or magnetic lifter, they are serving for some specialty application owing to its matchless temperature stability.

AlNiCo can be made by either casting or sintering processes. AlNiCo grades mainly vary in Cobalt content and relevant heat treatment process. Cast magnets are larger in density which provide they better magnetic performance. Casting process also well-suited to large and complex shapes. Sintered magnets exhibit slighter lower magnetic performance but better mechanical properties.

| Material | Maximum energy product (BH) _{max} | Curie Temperature T _c | Coefficient of Thermal Expansion | Electrical Resistivity | Density | Hardness | Tensile Modules |
|------------------------|--|----------------------------------|----------------------------------|------------------------|-------------------|----------|--------------------|
| | MGOe | °C | 10 ⁻⁶ /°C | μΩ·m | g/cm ³ | HRC | kN/mm ² |
| Cast AlNiCo Magnet | 1.00-5.25 | 760-860 | 11.0-13.0 | 45-75 | 6.9-7.3 | 45-55 | 0.02-0.15 |
| Sintered AlNiCo Magnet | 1.00-12.00 | 810-860 | 11.0-12.4 | 50-70 | 6.8-7.0 | 45 | 0.35-0.45 |

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Cast AlNiCo Magnets

Most AlNiCo magnets are belonging to cast type and AlNiCo5 is the most frequently used grade among them. Cast AlNiCo magnet is produced by common foundry processes. Cast AlNiCo magnet can be divided to the isotropic form and anisotropic form base on whether apply the orientation magnetic field during the cooling process. The majority of cast AlNiCo magnet are anisotropic magnet to fully enhance magnetic properties. Therefore, AlNiCo blank will be machined to exact geometry and tolerance after underwent heat treatment process.

Typical magnetic properties of cast AlNiCo magnets

Magnetic properties of different manufacturers vary slightly. Following data are only for reference when designing and selecting materials.

| Grade | Residual magnetic flux density B_r | | Coercive force H_{cB} | | Maximum energy product $(BH)_{max}$ | | Temperature Coefficients | | Curie Temperature T_c | Work Temperature T_w | MMPA Standard | IEC Standard |
|-------|--------------------------------------|-------|-------------------------|-----|-------------------------------------|------|--------------------------|----------|-------------------------|------------------------|---------------|--------------|
| | mT | Gs | kA/m | Oe | kJ/m ³ | MGOe | B_r | H_{cJ} | °C | °C | | |
| | | | | | | | % / °C | | | | | |
| LN10 | 600 | 6000 | 40 | 500 | 10 | 1.2 | -0.02 | -0.03 | 810 | 450 | AlNiCo3 | AlNiCo10/4 |
| LNG12 | 700 | 7000 | 44 | 550 | 12 | 1.5 | -0.02 | -0.03 | 810 | 450 | AlNiCo2 | AlNiCo12/5 |
| LNG13 | 680 | 6800 | 48 | 600 | 13 | 1.63 | -0.02 | -0.03 | 810 | 450 | | AlNiCo13/5 |
| LNG18 | 900 | 9000 | 48 | 600 | 18 | 2.25 | -0.02 | -0.03 | 850 | 450 | AlNiCo4 | AlNiCo18/5 |
| LNG37 | 1200 | 12000 | 48 | 600 | 37 | 4.63 | -0.02 | -0.03 | 860 | 525 | AlNiCo5 | AlNiCo37/5 |
| LNG40 | 1250 | 12500 | 48 | 600 | 40 | 5 | -0.02 | -0.03 | 860 | 525 | | AlNiCo40/5 |

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| | | | | | | | | | | | | |
|---------|------|-------|-----|------|----|------|-------|-------|-----|-----|---------------|-------------|
| LNG44 | 1250 | 12500 | 52 | 650 | 44 | 5.5 | -0.02 | -0.03 | 860 | 525 | | AlNiCo44/5 |
| LNG52 | 1300 | 13000 | 56 | 700 | 52 | 6.5 | -0.02 | -0.03 | 860 | 525 | AlNiCo5 DG | AlNiCo52/6 |
| LNG60 | 1330 | 13300 | 60 | 750 | 60 | 7.5 | -0.02 | -0.03 | 860 | 525 | AlNiCo5- 7 | AlNiCo60/6 |
| LNGT18 | 580 | 5800 | 90 | 1130 | 18 | 2.25 | -0.02 | -0.03 | 860 | 550 | AlNiCo7 | AlNiCo17/9 |
| LNGT28 | 1000 | 10000 | 58 | 720 | 28 | 3.5 | -0.02 | -0.03 | 860 | 525 | AlNiCo6 | AlNiCo26/6 |
| LNGT32 | 800 | 8000 | 100 | 1250 | 32 | 4 | -0.02 | -0.03 | 860 | 550 | AlNiCo8 | AlNiCo32/10 |
| LNGT38 | 800 | 8000 | 110 | 1380 | 38 | 4.75 | -0.02 | -0.03 | 860 | 550 | | AlNiCo38/11 |
| LNGT44 | 850 | 8500 | 120 | 1500 | 44 | 5.5 | -0.02 | -0.03 | 860 | 550 | | AlNiCo44/12 |
| LNGT48 | 900 | 9000 | 120 | 1500 | 48 | 6 | -0.02 | -0.03 | 860 | 550 | | AlNiCo48/12 |
| LNGT60 | 950 | 9500 | 110 | 1380 | 60 | 7.5 | -0.02 | -0.03 | 860 | 550 | | AlNiCo60/11 |
| LNGT72 | 1050 | 10500 | 112 | 1400 | 72 | 9 | -0.02 | -0.03 | 860 | 550 | AlNiCo9 | AlNiCo72/11 |
| LNGT88 | 1100 | 11000 | 115 | 1450 | 88 | 11 | -0.02 | -0.03 | 860 | 550 | | AlNiCo88/12 |
| LNGT36J | 700 | 7000 | 140 | 1750 | 36 | 4.5 | -0.02 | -0.03 | 860 | 550 | AlNiCo8 HC | AlNiCo8HC |

The above-mentioned data of magnetic properties and physical properties are given at room temperature (20°C).

The max working temperature of magnet is changeable due to length-diameter ratio, coating thickness and other environment factors.

Additional grades are available. Please contact us for information.

Sintered AlNiCo Magnets

Sintered AlNiCo magnets are manufactured by traditional powder metallurgy technology which basically same as other sintered permanent magnets. Sintered AlNiCo magnets are well adapted for small-sized (less than 28 grams), thin, light, and special shaped magnets. In addition to high dimensional accuracy, tight tolerance, and without further machining steps, sintered AlNiCo magnets also exhibit

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slightly mechanical strength and machinability. Viewing from the large volume production, sintered AlNiCo magnets have higher material utilization ratio, lower composition segregation, and magnetic performance fluctuation in comparison with cast AlNiCo magnet.

Typical magnetic properties of sintered AlNiCo magnets

Magnetic properties of different manufacturers vary slightly. Following data are only for reference when designing and selecting materials.

| Grade | Residual magnetic flux density B_r | | Coercive force H_{cB} | | Maximum energy product $(BH)_{max}$ | | Temperature Coefficients | | Curie Temperature T_c | Work Temperature T_w | MMPA Standard | IEC Standard |
|----------|--------------------------------------|-------|-------------------------|------|-------------------------------------|------|--------------------------|----------|-------------------------|------------------------|---------------|--------------|
| | mT | Gs | kA/m | Oe | kJ/m ³ | MGOe | B_r | H_{cJ} | | | | |
| | | | | | | | %/ $^{\circ}C$ | | $^{\circ}C$ | $^{\circ}C$ | | |
| FLN8 | 500 | 5000 | 40 | 500 | 9 | 1.13 | -0.02 | -0.03 | 760 | 450 | AlNiCo3 | AlNiCo8/3 |
| FLNG12 | 700 | 7000 | 48 | 600 | 12 | 1.55 | -0.02 | -0.03 | 810 | 450 | AlNiCo2 | AlNiCo12/5 |
| FLNG18 | 600 | 6000 | 90 | 1130 | 18 | 2.2 | -0.02 | -0.03 | 860 | 450 | AlNiCo7 | AlNiCo18/9 |
| FLNG34 | 1200 | 12000 | 48 | 600 | 34 | 4.25 | -0.02 | -0.03 | 890 | 450 | AlNiCo5 | AlNiCo34/5 |
| FLNG37 | 1250 | 12500 | 48 | 600 | 37 | 4.63 | -0.02 | -0.03 | 890 | 450 | AlNiCo6 | AlNiCo37/6 |
| FLNGT28 | 1050 | 10500 | 60 | 600 | 28 | 3.5 | -0.02 | -0.03 | 850 | 450 | AlNiCo6 | AlNiCo28/6 |
| FLNGT38 | 800 | 8000 | 120 | 1500 | 38 | 4.75 | -0.02 | -0.03 | 850 | 450 | AlNiCo8 | AlNiCo38/12 |
| FLNGT42 | 880 | 8800 | 120 | 1500 | 42 | 5.25 | -0.02 | -0.03 | 820 | 450 | | AlNiCo42/12 |
| FLNGT33J | 700 | 7000 | 140 | 1750 | 33 | 4.13 | -0.02 | -0.03 | 850 | 450 | AlNiCo8 HC | AlNiCo33/14 |

The above-mentioned data of magnetic properties and physical properties are given at room temperature (20°C).

The max working temperature of magnet is changeable due to length-diameter ratio, coating thickness and other environment factors.

Additional grades are available. Please contact us for information.

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Precautions regarding safety and use

1. When a magnet is magnetized, strong attractive force or repulsive force arises between the magnet and other magnetic materials (magnet, yoke, rotor, stator, jig fixture, tool, etc.). A user's hand or finger may be sandwiched between the magnet and other magnetic materials during the handling or the assembling. Also, you may be injured by loss of balance of the body due to the attractive or repulsive force. Use appropriate jigs and take special care in handling the magnetized magnet. A magnetized magnet should be covered with a non-magnetic material such as wood or thick plastics and labeled as magnetized.
2. Sharp edge of a magnet may injure your finger. Protect fingers when needed.
3. When a magnet is magnetized in the winding coil, the magnet may fly out from the inside of the winding coil unexpectedly. It can be the cause of injury. Use a proper jig fixture and keep a magnet inside of the winding coil for safety.
4. When magnetized magnets are stacked, it is difficult to peel off, and chipping or a crack may occur. It is recommended to use spacers between the magnets. The stacked magnetized magnets are similar to one big magnet.
5. When a magnetized magnet is placed near the direct or alternating magnetic field, the demagnetization may occur.
6. A mechanical impact may be a cause of a fracture, a crack and a chipping of a magnet. Take special care during the handling of a magnetized magnet. Such a crack or a chipping may deteriorate the magnetic characteristic, the mechanical strength or the corrosion resistance. A broken piece of magnet may hurt your eyes or body.
7. Store magnets in the place without a mechanical impact. Keep the packaging materials of magnets to be dry. Keep the temperature above the dew point to prevent rust during the storage. Avoid water (rain, water used in the factory, etc.) to be splashed on the packaging material.

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About MagnetSearcher

MagnetSearcher provides advanced magnets manufacturing services to engineers, designers, or procurement specialists worldwide.

At MagnetSearcher, you are no longer subject to the limits of your existing local suppliers. We integrate seamlessly with over 2,000 vetted manufacturing facilities across China. This means our customers can dynamically scale their product development needs or product output by sending manufacturing orders to MagnetSearcher.



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Put our highly vetted supplier network to work for you



500+ Magnet Experts

Get experienced magnet expert help when you need it



50000+ Magnets Quoted

Translates to better prices and lead times for you




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