



# Alnico

Aluminium, Nickel, Cobalt also referred to as Alnico (Alcomax and Hycomax) is manufactured by traditional foundry casting or sintering techniques and was developed in the 1930's. Its principal applications are for triggering of proximity switches such as reeds and hall effects. Other applications include, instrumentation, high temperature 'pot', holding magnets, horseshoe designs for lifting, entry door locks, NDT, magnetic fluid seals, and ferrous separation including sump plugs.

This material offers the best temperature coefficient (0.02% per degree centigrade) of all permanent magnets, thus making it an ideal choice when a constant field over a wide (-270°C to +500°C) temperature range is required.

The high nickel content results in good stability against corrosion and oxidation, this metallic composition is also a good electrical conductor, however being coarse-grained, hard and brittle, it cannot be drilled or conventionally machined and should not be used as a structural component.

Alnico is a low coercive force material and where possible should be magnetised after assembly. Its performance can be easily reduced by poor handling or exposure to other magnetic fields. Again, because of low coercivity to reach optimum performance, Rod magnets should have a magnetic length of approximately five times the diameter when used in open circuit applications. For example, a rod magnet of 5mm diameter should be 25mm magnetic length.

Because of the Cobalt content within the magnet composition Alnico magnets are often not low cost solutions.

| Cast Alnico Grades |                          |            |          |                         |         |             |                      |             |
|--------------------|--------------------------|------------|----------|-------------------------|---------|-------------|----------------------|-------------|
| Grade              | MMPA                     | Br         | Hcb      | (BH) <sub>max</sub>     | Curie   | Max Working | T <sub>c</sub> of Br | T.C. α(Hc)  |
|                    |                          | mT/Gs      | kA/m /Oe | kJ/m <sup>3</sup> /MGOe | °C      | °C          | %/°C                 | %/°C        |
|                    |                          | Typ        | Typ      | Typ                     | Typ     | Typ         | Typ                  | Typ         |
| LN10               | ALNICO3<br>isotropic     | 800/8000   | 40/500   | 10/1.25                 | 750     | 550         | -0.02                | -0.03~+0.03 |
| LNG10              |                          | 600/6000   | 44/550   | 10/1.25                 | 750     | 550         | -0.02                | -0.03~+0.03 |
| LNG12              | ALNICO2<br>isotropic     | 700/7000   | 44/550   | 12/1.50                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNG13              |                          | 680/6800   | 48/600   | 13/1.63                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNG16              | ALNICO4                  | 800/8000   | 48/600   | 16/2.00                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNG18              |                          | 900/9000   | 48/600   | 18/2.25                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNG37              | ALNICO5<br>(Alcomax III) | 1200/12000 | 48/600   | 37/4.63                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNG40              |                          | 1230/12300 | 48/600   | 40/5.00                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNG44              |                          | 1250/12500 | 52/650   | 44/5.50                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNG48              | ALNICO5DG                | 1280/12800 | 56/700   | 48/6.00                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNG52              |                          | 1300/13000 | 56/700   | 52/6.50                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNG56              | ALNICO5-7                | 1300/13000 | 58/720   | 56/7.00                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNG60              |                          | 1330/13300 | 60/750   | 60/7.50                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNGT28             | ALNICO6                  | 1000/10000 | 56/700   | 28/3.50                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNGT30             |                          | 1100/11000 | 56/700   | 30/3.75                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNGT18             | ALNICO8<br>(Hycomax III) | 580/5800   | 80/1000  | 18/2.25                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNGT32             |                          | 800/8000   | 100/1250 | 32/4.00                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNGT38             |                          | 800/8000   | 110/1380 | 38/4.75                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNGT44             |                          | 850/8500   | 115/1450 | 44/5.50                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNGT48             | ALNICO8HE                | 900/9000   | 120/1500 | 48/6.00                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNGT60             | ALNICO9                  | 900/9000   | 110/1380 | 60/7.50                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNGT72             |                          | 1050/10500 | 112/1400 | 72/9.00                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNGT80             |                          | 1080/10800 | 120/1500 | 80/10.00                | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNGT88             |                          | 1100/11000 | 115/1450 | 88/11.00                | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNGT96             |                          | 1150/11500 | 118/1480 | 96/12.00                | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNGT36J            | ALNICO8HC                | 700/7000   | 140/1750 | 36/4.50                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNGT48J            |                          | 800/8000   | 145/1820 | 48/6.00                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |
| LNGT52J            |                          | 850/8500   | 140/1750 | 52/6.50                 | 800~850 | 550         | -0.02                | -0.03~+0.03 |

## Sintered Alnico Grade

| Grade   | MMPA        | Br         | Hcb      | (BH)max                 | Curie   | Max Working | T.C. α(Br) | T.C. α(Hcj) |
|---|-------------|------------|----------|-------------------------|---------|-------------|------------|-------------|
|   |             | mT/Gs      | kA/m /Oe | kJ/m <sup>3</sup> /MGoe | °C      | °C          | %/°C       | %/°C        |
|   |             | Typ        | Typ      | Typ                     | Typ     | Typ         | Typ        | Typ         |
| FLN8 *  | S.ALNICO3   | 500/5000   | 40/500   | 8/1.00                  | 760     | 450         | -0.02      | -0.03~+0.03 |
| FLNG12*   | S.ALNICO2   | 650/6500   | 48/600   | 12/1.50                 | 800~850 | 450         | -0.02      | -0.03~+0.03 |
| FLNGT18   | S.ALNICO7   | 600/6000   | 90/1130  | 18/2.20                 | 800~850 | 450         | -0.02      | -0.03~+0.03 |
| FLNG34  | S.ALNICO5   | 1200/12000 | 48/600   | 34/4.25                 | 800~850 | 450         | -0.02      | -0.03~+0.03 |
| FLNGT28   | S.ALNICO6   | 1050/10500 | 56/700   | 28/3.50                 | 800~850 | 450         | -0.02      | -0.03~+0.03 |
| FLNGT38   | S.ALNICO8   | 800/8000   | 110/1300 | 38/4.75                 | 800~850 | 450         | -0.02      | -0.03~+0.03 |
| FLNGT42   | S.ALNICO8   | 850/8500   | 120/1500 | 42/5.25                 | 800~850 | 450         | -0.02      | -0.03~+0.03 |
| FLNGT33J  | S.ALNICO8HC | 700/7000   | 140/1750 | 33/4.13                 | 800~850 | 450         | -0.02      | -0.03~+0.03 |
| Note: Curie temperature and temperature coefficient are for reference, but not as inspection base |             |            |          |                         |         |             |            |             |
| * Isotropic Grades  |             |            |          |                         |         |             |            |             |