- AlNiCo magnets -

1. Application and purpose

2. Definitions

3. Characteristic material properties

4. Geometrical dependency

5. Permitted deficiencies

6. Coating

7. Safety instructions

8. Health risks

9. Freedom from pollutants

	Orga	Date	Identification code	Index	Description of the change
Revised by	334	08.07.2008	Mr. Krzywinski	4	Sections 4.1, 7 and 9 revised
Revised by					
Revised by					

These technical delivery terms replace the previously applicable TL-270-03 dated 25.08.04 and refer to the EU guidelines 67/548/EC 2000/53/EC 2002/95/EU as well as to the material disclosure of the products by the IMDS system.

- AlNiCo magnets -

1. Application and purpose

These technical terms of delivery are considered to be a drawing supplement and consequently part of the contract. All the values and agreements stated in component drawings and specifications take priority over these technical terms of delivery.

2. Definitions

Not magnetized: Residual magnetism due to the production process is permitted.
The scope and the testing procedure need to be agreed with the customer in individual cases.

Non-magnetic: No residual magnetism permitted.
Testing with steel balls according to testing instruction No. 8.

3. Characteristic material properties

AlNiCo magnets are subject to a temperature coefficient of flux density and of physical coercive field strength of:

$$TK_{Br} \cong -0.02\ \%/K;\ TK_{HcJ} \cong -0.02\ \%/K$$

They can be employed at temperatures of up to approximately 450 °C.

Due to their low coercive field strength, magnetized AlNiCo magnets must not be exposed to stray magnetic fields (electromagnetic fields or other permanent magnets).
This also applies to direct contact with ferromagnetic materials.

It is recommended to magnetize AlNiCo magnets only during or after assembly.

4. Geometrical dependency of AlNiCo magnets

Small volumes cool down faster inside the mold than larger parts. During heat treatment, the cooling behavior of small and large volumes is also very different. The magnetic values depend both on the crystal size and on the temperature gradients during field treatment or cooling respectively.

4.1 Minimum volumes

DIN IEC 60404-8-1 refers to the interdependency between magnetic values and the magnet geometry.
The minimum magnetic values apply only to magnets with a cross-section which remains unchanged along the axis of magnetization, with a volume of between 1 cm^2 and 200 cm^2 and with an extent of at least 8 mm in all spatial dimensions.
If these dimensions are not achieved then the maximum deviations set out below are permitted:

B_r	=	10 % less than the minimum catalog value
H_{cB}	=	10 % " " "
H_{cJ}	=	10 % " " "
$(BH)_{max}$	=	15 % " " "

4.2 Maximum volumes

Only applies to anisotropic AlNiCo A 40/12 alloys with a high titanium content
During isothermal heat treatment, magnets with a volume ≥ 25 cm^3 cannot be cooled down fast enough from the homogenization temperature to the field annealing temperature. A shortfall in minimum magnetic values of up to 20 % is permitted.

5. Permitted deficiencies

The permitted optical defects of AlNiCo magnets are defined.
The permitted deficiencies are material- and/or technology-related and do not affect the magnetic and mechanical properties of the magnets under normal conditions of use.

Defects whose size exceeds the defined limit by more than 5 % will be acknowledged as defects.

Defects of the same kind affecting the same part will be added together and must not exceed 50 % of the defined permitted defect.

If multiple defects occur to the same part, then these are permitted provided that they do not exceed 75 % of the corresponding defined maximum limit.

Defects not represented in the following will be judged by the same criteria as the recorded defects.

5.1 AlNiCo round bar magnets (classified according to Magnetfabrik Bonn standard)

Blow holes: ≤ 10 % of the surface permitted
Chippings: ≤ 20 % of the surface permitted

Circumferential surface: raw cast surfaces below the minimum dimension are permitted in part

5.2 AlNiCo block and ring magnets (classified according to Magnetfabrik Bonn standard)

a) Fettled surfaces
Blow holes: ≤ 10 % of the surface permitted
Chippings: ≤ 20 % of the surface permitted

b) Ground surfaces
Blow holes: ≤ 5 % of the surface permitted
Chippings: ≤ 10 % of the surface permitted

5.3 Crack formation

Production-related cracks are possible and permitted for magnets with a unit weight ≥ 250 grams.

5.4 Systems with AlNiCo magnets

Chipped areas are permitted for system magnets, provided the magnetic specifications are met.

6. Coating

Magnetfabrik Bonn GmbH provides only a limited range of coatings for AlNiCo magnets.

7. Safety instructions

Detailed information about the handling of permanent magnets is available on our homepage: www.magnetfabrik.de, under Downloads "Safety instructions"

8. Health risk on contact with food and drinking water

We **always** recommend **avoiding** direct contact between food or drinking water and AlNiCo magnets since metal ions may be released in aqueous environments.

9. Freedom from pollutants

Magnetfabrik Bonn GmbH has successfully introduced an environment management system in accordance with DIN ISO 14001.

Adherence to the directives of the European Parliament and Council

- Council Directive 67/548/EC on the harmonization of the legal and administrative requirements for the classification, packaging and labeling of dangerous preparations
- European Parliament and Council Directive 2000/53/EC concerning end-of-life vehicles
- European Parliament and Council Directive 2002/95/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment
- as well as the Global Automotive Declarable Substance List (GADSL) issued by the Verband der Automobilindustrie (Automotive Industry Association)

is guaranteed for our products.

If requested, the material data sheet can be enclosed as part of the initial sample documentation to indicate the composition of the product.
Customers that are registered as users in the International Material Data System (IMDS) will obtain information about the entry in the IMDS.