- AlNiCo magnets -

	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
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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 % " " "

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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.

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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. Hazardous substances

Our statement regarding Hazardous substances (ROHS & REACH) is provides on our homepage: www.magnetfabrik.de/ in the download documents.

As part of the initial sampling documentation, the material data sheet can be attached on request, from which the composition of the product can be taken.

For customized products, an entry is usually made in the International Material Data System (IMDS). Information about an entry is provided automatically via the customer's USER ID in the IMDS.

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