

Acal BFi kOr - amorphous and nanocrystalline cores by Acal BFi

Tape wound cores from Acal BFi

Acal BFi is a long-standing specialist provider for soft magnetic cores from world-leading manufacturers, covering all available core materials and shapes. With the creation of the Acal BFi kOr brand we complete our portfolio, focusing on Fe-based amorphous and nanocrystalline tape wound cores.

Product Management is executed by our Custom Services for Magnetic Components department. Our long-term expertise in designing, testing, manufacturing and application of amorphous and nanocrystalline cores provides customers with maximum product quality and fit – and we ensure this stable high quality with our modern test equipment for impedance analysis, high-current/high-voltage testing, power loss and climate chamber measurement.

Tape material, determining core quality and reproducibility, is used exclusively from world-leading suppliers like Hitachi Metals, Metglas®, VACUUMSCHMELZE®, or AT&M following Acal BFi's strategy to provide high-quality products, yet at competitive cost.

Acal BFi intends to best meet customer's application requirements by providing customized cores in terms of material, size, shape, specification and finishing at attractive prices. We offer this also in lower volumes for development purposes or small projects, even with short lead times.



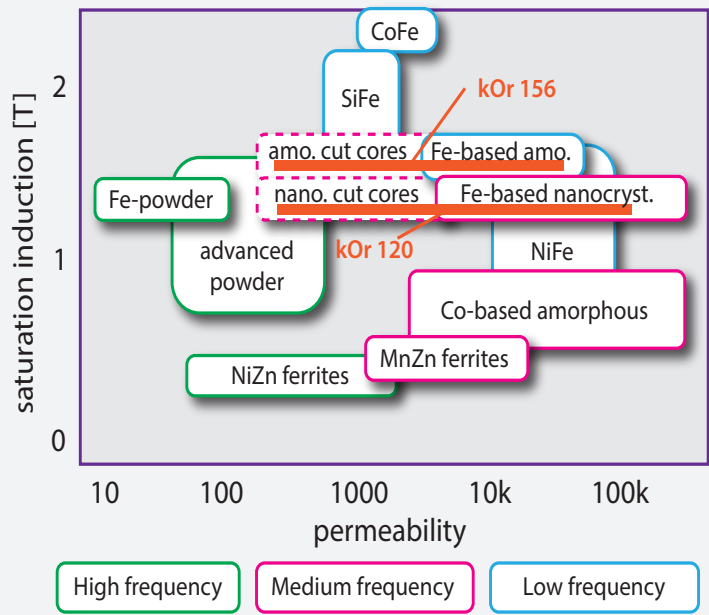
Acal BFi provides the following documents to support the design work for component's development:

- Core material information sheets (material properties and values/curves for magnetic parameters)
- Application notes for special shapes (e.g. additional information for cut cores)
- Core datasheets

Product description

Amorphous and nanocrystalline Acal BFi kOr products are made of wound metal ribbons of different material families (see below). The ribbons are fabricated by the Rapid Solidifying Technology, i.e. they are cast directly from the melt with final thickness of 15 – 30 μm being in amorphous state. Magnetic properties are adjusted usually by a heat treatment after core winding, often in a magnetic field. During this treatment, material may be crystallized forming the nanocrystalline state.

Cores can be formed into toroidal, oval, rectangular or more complex shapes. Additionally, the cores can be cut to reduce permeability and to allow usage of bobbins. Since bare cores are not suitable for application due to sharp edges, brittleness of tape material and lack of insulation, the cores are protected by a specific finishing.



Material families

Currently, cores from two material families are offered:

kOr 156 products are made of iron-based amorphous material which has been developed as a contemporary replacement for electrical steel. Thanks to its small tape thickness and high saturation induction, it is possible to reduce losses as well as weight and dimensions especially in low-frequency applications. This makes components highly efficient in both purchasing and operational costs. Acal BFi offers standard cut cores and a broad variety of customised shapes and finishings.

kOr 120 products are made of iron-based nanocrystalline material with high saturation flux density, low losses, high permeability up to 100 kHz and low magnetostriction. They are the preferred choice for mid-frequency power applications and Common Mode Chokes with wide band attenuation. Different B(H) characteristics are available. With flat hysteresis loop, low remnant flux B_r and adjustable permeability between 25.000 and 120.000 (at 10 kHz), they provide superior properties. Acal BFi offers standard sizes of toroidal cores as well as a broad variety of customised shapes and finishings including cut cores.

	materials base	B_s [T]	λ_s [ppm]	tape width [μm]	reference materials			
					Hitachi Metals / Metglas	VAC	Magnetec	AT&M
kOr 156	Fe-base amorphous	1.56	27	26	2605SA1			1K101
kOr 120	Fe-base nanocrystalline	1.20	<1	17-20	FT-3	VP500/800	Nanoperm	1K107B

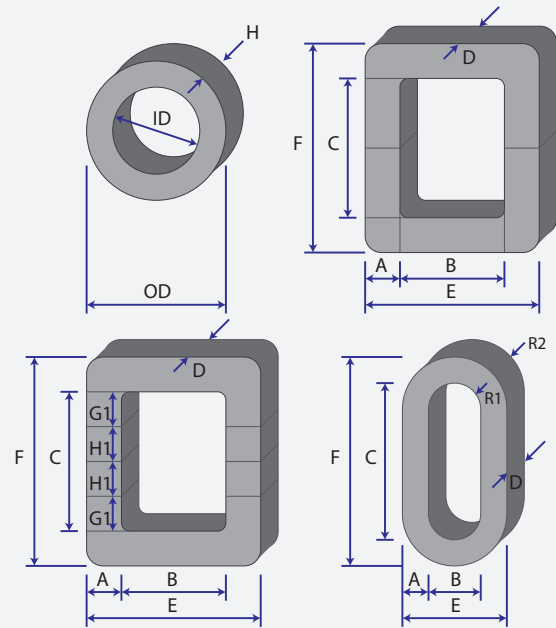
Note: Tape thickness is defined here as mean thickness measured by weight, length and width of tape using a known density. Often geometrical thickness, measured with a gauge or by the height of a stack, is used – this effective thickness is higher by about 10 - 15%.

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Shapes, cuts and dimensions

Acal BFi offers toroids, E-, U- and I-cores in standard types (toroids for kOr 120, U-core sets for kOr 156) as well as in customised sizes. Number and position of cuts can be adapted to the application. For development purposes, we offer uncut cores or different variants to enable the developer to optimize the design.

Several different nomenclatures are used globally to define the dimensions and geometrical tolerances of cores or core pieces. The drawings to the right depict the nomenclature used for the Acal BFi kOr line. In general, nominal dimensions are given for bare cores, not including the finishing!

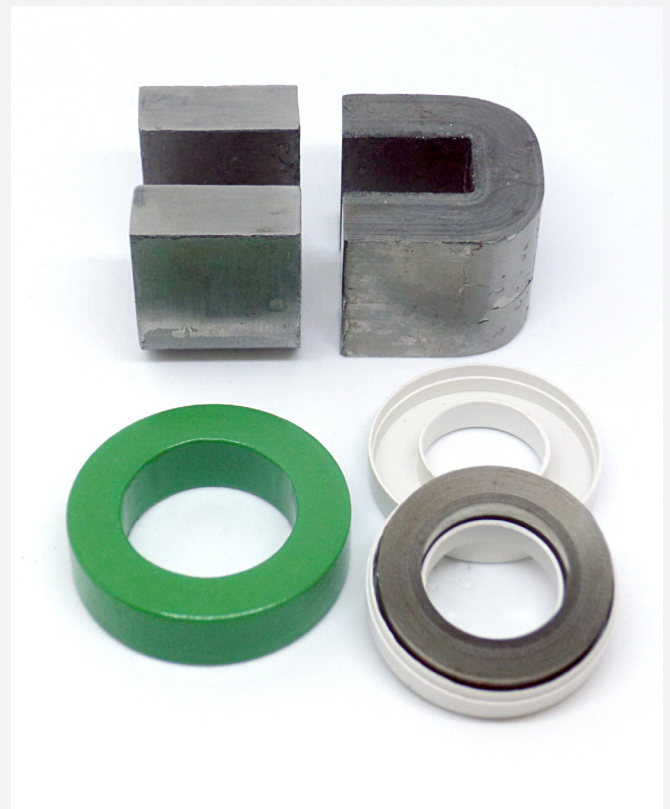


Finishings

Depending on shape and size of the core, as well as the application requirements (UL classes, mechanical and thermal conditions), Acal BFi can provide different finishings (standard temperature classes in brackets):

- Plastic core boxes; cores are fixed with glue and customised core boxes in different materials/ shapes including winding spacers are possible (min. E: 120°C)
- Epoxy coating (min. B: 130°C)
- Impregnation with resin (F: 155°C)
- Enforcement with fiber tape and impregnation (F: 155°C)

All materials and components are conformal with UL, RoHS and REACH regulations. Further information about these materials is provided in our data sheets.



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Part numbering system, data sheets, web overview

The Acal BFi kOr line uses the following part number syntax for amorphous and nanocrystalline cores:

<p>120</p> <p> </p> <p>Specific Material</p> <p>indicates the saturation induction</p> <p>e.g. 120 means $B_s = 1,20\text{T}$ for a certain Fe-nanocryst. material</p>	<p>T B</p> <p> </p> <p>Shape and Finish</p> <p>Shape (1st letter): T = toroid R = rectangular O = oval E = E-core U = U-core I = I-core (bar)</p> <p>Finish (2nd letter): B = plastic boxing E = epoxy coating P = parylene coating I = epoxy impregnated T = tape reinforced and impregnated G = impregnated and gapped</p>	<p>25 20 10</p> <p> </p> <p>Size / Dimensions</p> <p>Toroids: OD ID H (outer diam, inner diam, height)</p> <p>or</p> <p>Rectangular cores: common size descriptions (Asian or European standard series)</p> <p>or</p> <p>Dimensions</p>	<p>70</p> <p> </p> <p>Cuts / Permeability</p> <p>For cut-cores: number of cuts, e.g. 2C for 2 cuts</p> <p>For non-cut cores: material's minimum permeability level (μ_{\min} @ 50/60 Hz or 10 kHz) in 1000, e.g. 70 for 70.000</p>	<p>1</p> <p> </p> <p>Variant of core</p> <p>One-digit number to indicate different types of cores with same shape, size and material, for example to indicate different coatings or positions of cuts</p>
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Examples:

120-TB-252010-70-1	nanocr. toroid in plastic boxing with OD = 25mm, ID = 20mm, H = 10mm and $\mu_{\min} = 70\text{k}$
156-RI-0125-1C-1	amorphous rectangular impregnated core with 1 cut equivalent to AMCC-0125

Our standard offer reflects only a small selection of the most common sizes. Also, our web overview subsumes all permeability levels and number/positions of cuts within one core type group. Consequently the published datasheets are meant as examples.

For kOr 120 toroids with flat hysteresis characteristics, permeability levels between 25.000 and 80.000 (lower limit at 10 kHz) are available. Additionally, round and rectangular B(H) loops are available.

Cut cores can be manufactured with any number and position of cuts. Very high cores are built from multiple cores. Please contact us for a customised offer for your special application via www.acalbfi.com/uk/suppliers/KOR. We will provide individual data sheets according to your demand, including helpful additional application information for designers.

Lead times

If **on stock** we deliver quickly from our logistics hub near Frankfurt (Main), Germany within **2 days**. If not stocked, our usual lead times comprise of production and transport as follows:

Production time:	samples:	5 - 10 working days	
	series parts:	15 working days for toroids, 25 working days for special shapes and cut cores	
Transport time:	<100 kg:	1 – 2 weeks by air freight	(Quicker delivery times subject to agreement.)
	>100 kg:	7 weeks by sea freight	

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