Specification for Soft Magnetic Material

kOr 120 / kOr 120HF

Nominal data:

	Symbol	Unit		Conditions
Chemical composition		at%	$Fe_{73,5}Cu_1Nb_3Si_{15,5}B_7$	
Saturation flux density (saturation induction)	B_{sat}	mT	1200 1120	H > 100 A/m 25°C H > 100 A/m 100°C
Curie temperature	T_c	°C	600	
Resistance	ρ	µΩm	1,15	
Density	d	g / cm^3	7,35	annealed
Saturation magnetostriction	λ_S	ppm	<1	annealed
Initial permeability (uncoated)	μ_i		20.000 - 200.000	adjustable[1)] 25°C
Nominal permeability	µ		30.000 - 120.000	adjustable[1)] 10 kHz
Remanence	B_r	mT	50 150	µ = 30.000, 50 Hz µ = 100.000, 50 Hz
Power losses (uncoated)	P_{Fe}	W/kg	4,5 60 45	10 kHz / 0,6 T 100 kHz / 0,3 T (kOr 120) 100 kHz / 0,3 T (kOr 120HF)
Tape thickness[2)]	d	µm	20 16	kOr 120 kOr 120HF
Tape width	b	mm	3 - 50	
Filling factor (stacking factor)	FF	%	>80 >76	kOr 120: b≤25 mm kOr 120: b>25 mm; all kOr 120HF
recommended max. storage and operational temperature		°C	120 - 200	depending on specification and operational conditions

Remarks:

1) Permeability µ can be adjusted in the range of about 30.000 - 120.000 (nominal value at 10 kHz).

A_L-values are calculated according to $$A_L = \mu_r \mu_0 \frac{A_{Fe}}{l_{Fe}}$$

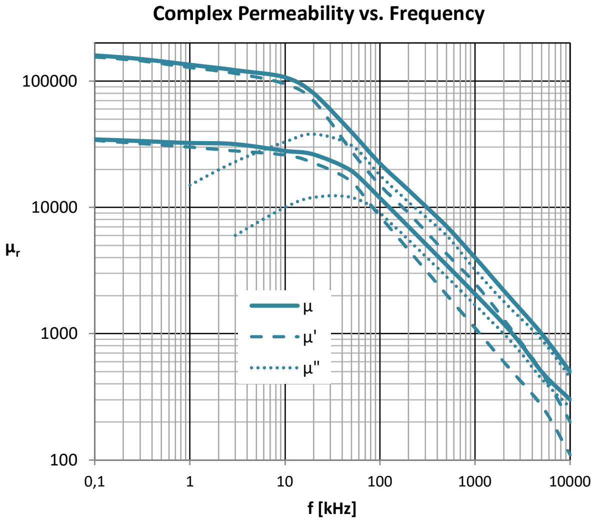
(A_L in mH, effective cross section A_{Fe} in mm^2, magnetic path length l_{Fe} in mm, $\mu_0 = 4\pi \cdot 10^{-7}$ Vs/Am)

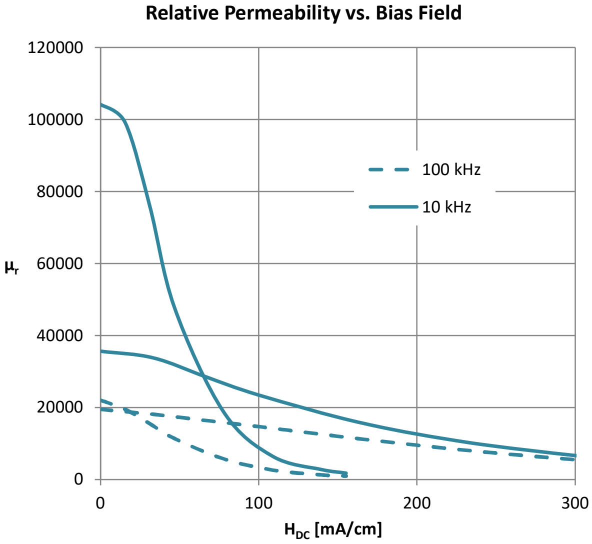
A_{Fe} and l_{Fe} depend on the core dimensions and are indicated in the core datasheets.

2) Effective tape thickness, calculated from length, width and density of a tape sample.
Geometrical tape thickness (measured with a tape stack using a gauge) is higher by 10% - 15% due to roughness.

Material characteristics (page 2) are measured with an annealed toroid core without gaps or cuts.
For Cut Cores, see page 3 and power losses at page 4.
Material data of specific product specifications may differ due to geometry and dimension.

Data for toroidal cores of kOr 120 in protection case





Notes:

Typical curves are given for cores with nominal permeability (10 kHz) of 30.000 and 100.000. Data for other permeabilities may be approximated using these data.

N = 1, U_{eff} = 100 mV

$$I_{DC} = H_{DC} \cdot l_{Fe}$$

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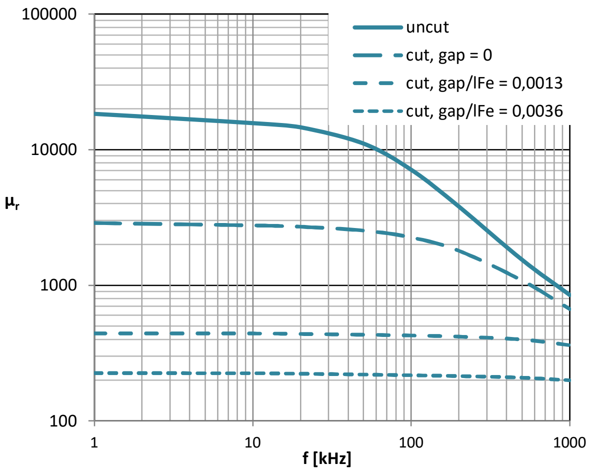
kOr 120 / kOr 120HF

Data for impregnated uncut and single cut cores of kOr 120

Effective Permeability vs. Frequency



Notes:

Cores are impregnated with Epoxy.

Typical curves are shown.

gap/lFe denotes single gap width in relation to mean path length l_{Fe} for l_{Fe} = 100 - 500 mm

N = 1, U_{eff} = 100 mV

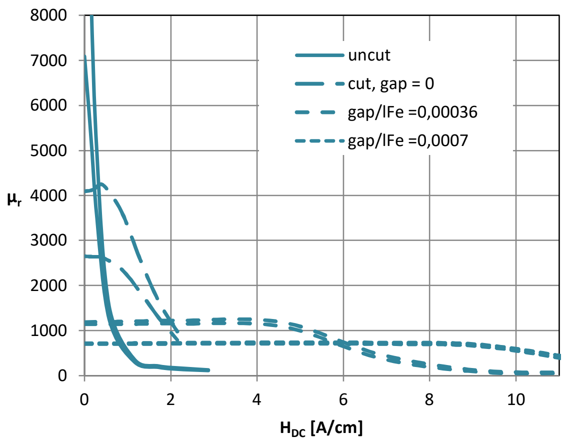
Nominal / minimum permeability for single cut cores without additional gap:

10 kHz: 2500 / 1600

100 kHz: 1900 / 1200

Nominal permeability at 10 kHz up to 10.000 is possible with special cut quality on request.

Effective Permeability vs. Bias Field

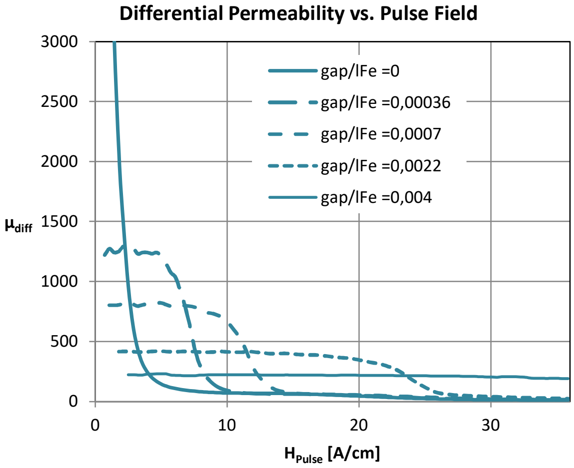


N = 1, U_{eff} = 100 mV

upper curves: 10 kHz; lower curves: 100 kHz

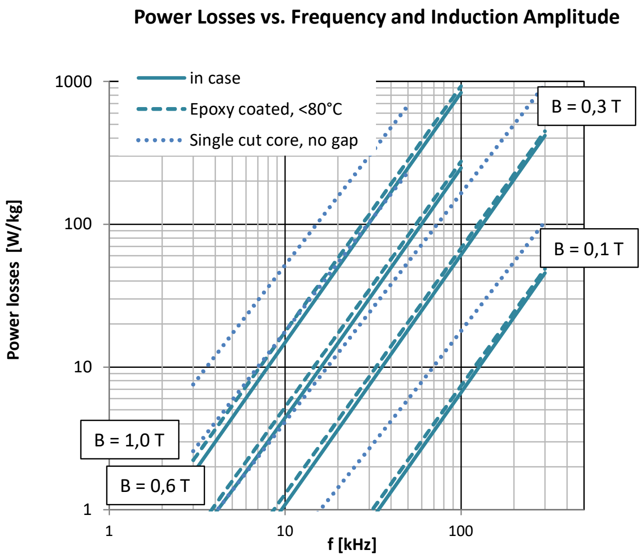
$$I_{DC} = H_{DC} \cdot l_{Fe}$$

Differential Permeability vs. Pulse Field



μ_{diff} monitored during pulse

Nominal power loss data for kOr 120



Notes:

Excitation with sinusoidal voltage of an amplitude corresponding to the indicated peak induction.

Losses of cores in plastic cases are nearly temperature independent, also at >80°C.
Losses of coated cores converge towards those of cores in cases between 80 and 130°C.

Power losses of impregnated cores might be higher than losses of coated cores, esp. <30 kHz.

Losses of cut cores increase with gap width and number of cuts.

Steinmetz-coefficients (nominal data):

$$P_{Fe} = k\, f^{a} \hat{B}^{b}$$

P_{Fe} in W/kg, f in kHz, B in T

valid for B ≤ 0,6 T, f = 5 … 150 kHz; losses are higher for B > 0,6 T

	Part Number	k	a	b
kOr 120 in protection case, μ_{nom} > 45.000	120-TB-…->30-…	0,22	1,75	2,02
kOr 120 in protection case, μ_{nom} < 45.000	120-TB-…-≤30-…	0,22	1,84	2,06
kOr 120 Epoxy coated, μ_{nom} > 45.000	120-TE-…->30-…	0,28	1,72	2,02
kOr 120 Epoxy coated, μ_{nom} < 45.000	120-TE-…-≤30-…	0,28	1,82	2,06
kOr 120HF in protection case	120HF-TB-…	0,24	1,66	2,02