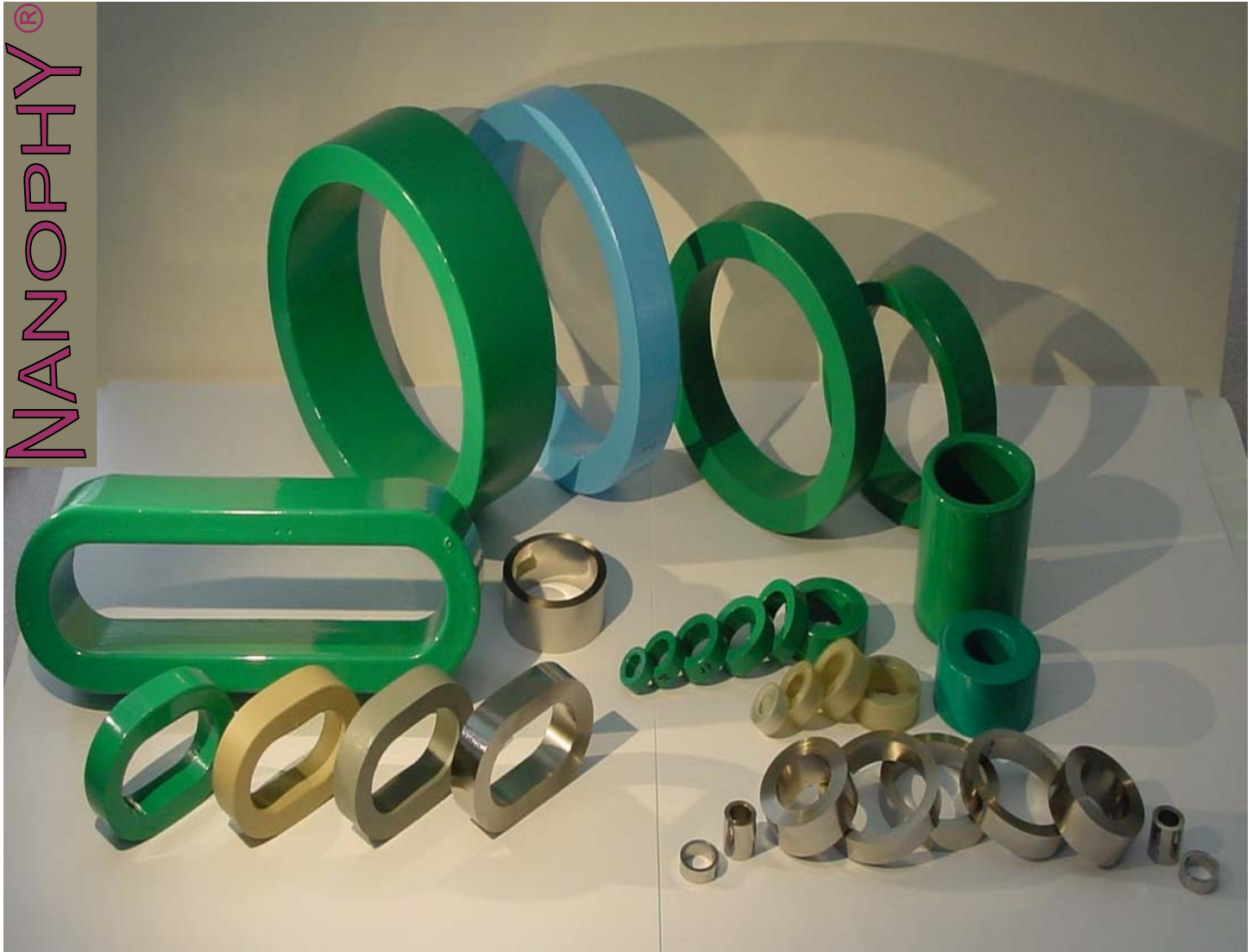


Nanocrystalline cores

Datasheet



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Nanophy® cores

Overview :



Our Nanophy® toroidal cores are made of **nanocrystalline** soft magnetic material.

From the ribbon melting by **IUP** (Imphy Ugine Précision) to the final packaged magnetic cores (produced by **Mécagis**, subsidiary of IUP), we control each step of the manufacturing process.

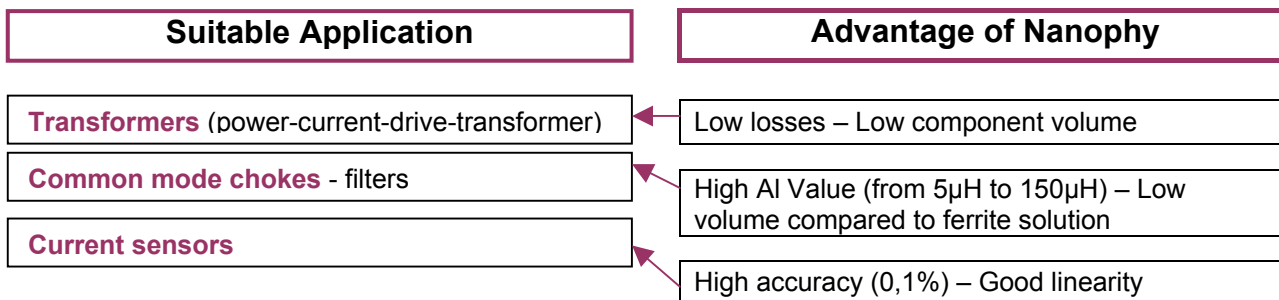
Based on a physical structure of nanocrystals (10nm in diameter), Nanophy cores present superior and cumulated properties compared to usual soft magnetic alloys (ferrite, FeNi, amorphous,...)

Properties :

- Wide panel of permeabilities : **20 000 to 200 000** (and more for 50 Hz applications)
- High saturation induction: **1,25 T**
- High operating temperature: **-40°C to 150°C**
- Low coercive field : **Hc < 10 mA/cm**
- Low magnetostriction : **< 5 ppm**
- Permeability stability with temperature and ageing ($\Delta\mu < 10\%$ at 150°C for 200 hours)
- Very low losses (**0,5 W/kg** at 0,1T and 20kHz)
- Volume and weight reduction comparing to ferrites and Silicon Iron cores
- Not adversely affected by vibrations and noise

Applications :

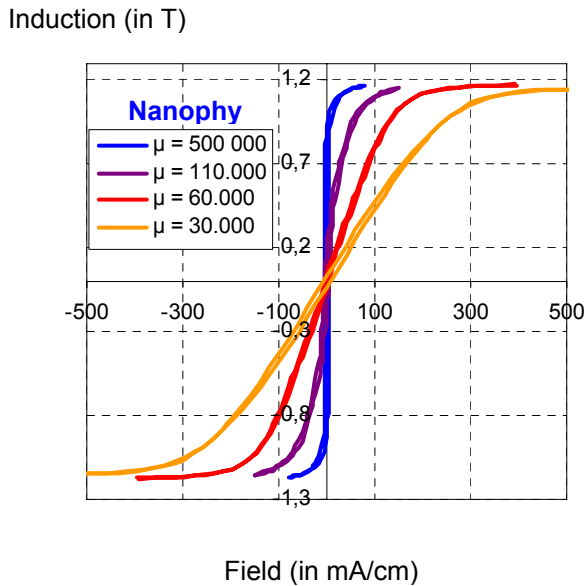
Their outstanding characteristics make Nanophy cores to be an efficient solution for many applications :



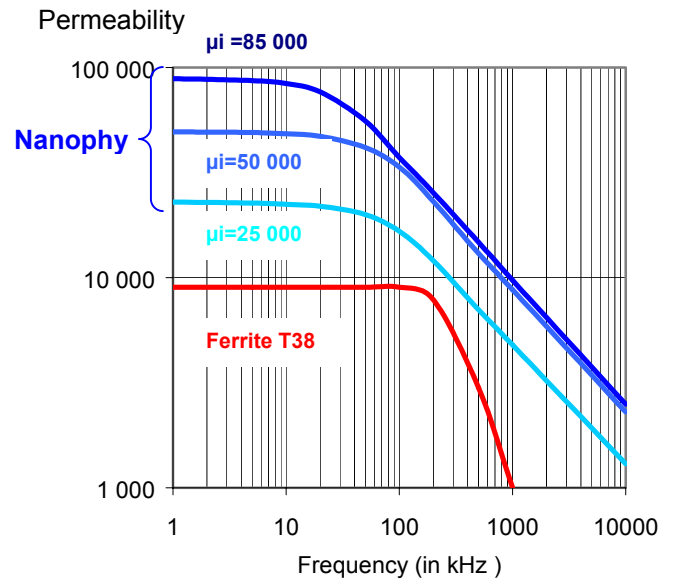
Comparison with usual materials:

	Amorphous Co-based	Ferrite MnZn	NiFe Permalloy (80%Ni)	Nanophy
Permeability (at 10 kHz)	> 90 000	<15 000	<20 000	20 000 to 200 000
Losses (25kHz; 0,2T; 100°C)	5 W/kg	17 W/kg	14 W/kg	3 W/kg
Saturation induction	0,6T	0,48T	0,8T	1,2T
Coercive Field	3 mA/cm	>30 mA/cm	5-15 mA/cm	5-10 mA/cm
Curie Temperature	210°C	220°C	400°C	600°C
Max. operating temperature	90°C	<100°C	120°C	150°C

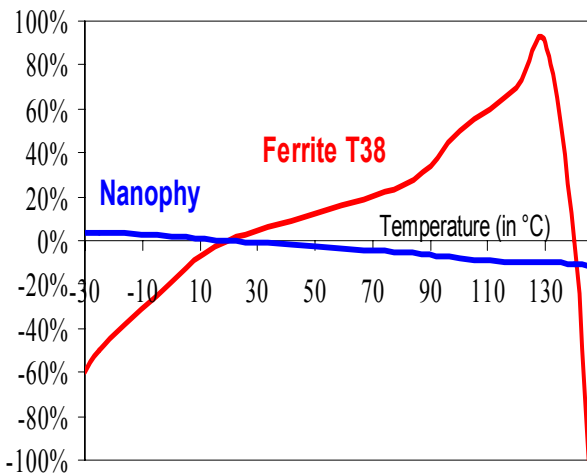
Hysteresis loop



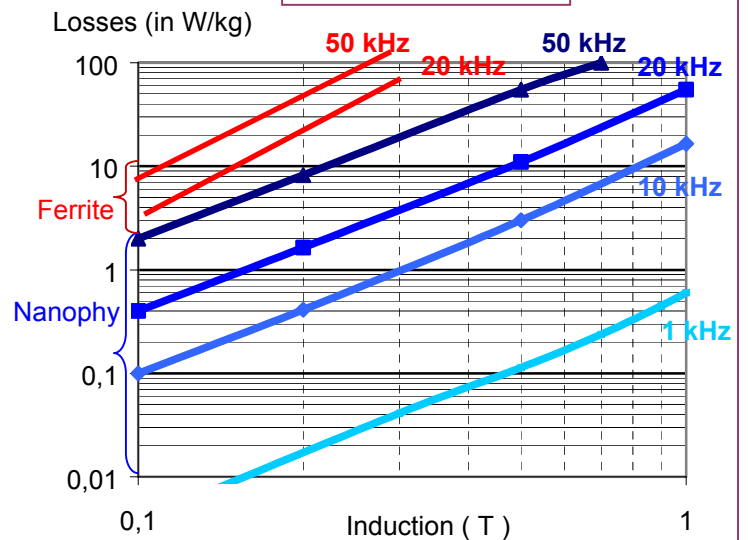
Initial Permeability stability



Permeability dependence on temperature



Magnetic Losses



Shape: usually **toroidal** but also available in oval shape.

Design: Nanophy[®] cores are available with 2 possible protections: **plastic case (UL94)** or **epoxy coated**.

Standards:

Present on the nanocrystalline market since 1999, we produce a wide panel of standard singular cores (see our catalogue next page).

Bespoke cores:

Our 40 year know-how in magnetic pieces enables us to propose dedicated cores (dimensions, permeability) depending on customer needs.

Standard Nanophy® Cores :



Name	Core dimensions Dext x Dint x height (in mm)	Finished dimensions Dext x Dint x height (in mm)	Permeability μ (at 10kHz)	Weight g	L_{Fe} cm	A_{Fe} cm ²	AI μ H at 10kHz	Design
N1	13,2 x 9 x 5	14,2 x 8 x 6	>30 000	2,1	3,5	0,08	6-21	Epoxy
T 44-1	16 x 10 x 6	18 x 8,5 x 8,2	30 000	4,3	4,1	0,14	9-18	Case
T 44-2	16 x 10 x 6	17 x 9 x 7	30 000	4,3	4,1	0,14	9-18	Epoxy
T 44-3	16 x 10 x 6	18 x 8,5 x 8,2	55 000	4,3	4,1	0,14	18-31	Case
T 44-4	16 x 10 x 6	17 x 9 x 7	55 000	4,3	4,1	0,14	18-31	Epoxy
T 44-5	16 x 10 x 6	18 x 8,5 x 8,2	>70 000	4,3	4,1	0,14	>31	Case
T 44-6	16 x 10 x 6	17 x 9 x 7	>70 000	4,3	4,1	0,14	>31	Epoxy
T 45-1	20 x 12,5 x 8	22,5 x 10 x 10	30 000	9	5,1	0,24	12-24	Case
T 45-2	20 x 12,5 x 8	21 x 11,5 x 9	30 000	9	5,1	0,24	12-24	Epoxy
T 45-3	20 x 12,5 x 8	22,5 x 10 x 10	55 000	9	5,1	0,24	24-41	Case
T 45-4	20 x 12,5 x 8	21 x 11,5 x 9	55 000	9	5,1	0,24	24-41	Epoxy
T 45-5	20 x 12,5 x 8	22,5 x 10 x 10	>70 000	9	5,1	0,24	>41	Case
T 45-6	20 x 12,5 x 8	21 x 11,5 x 9	>70 000	9	5,1	0,24	>41	Epoxy
T 46-1	25 x 16 x 10	27,5 x 13,5 x 12,5	30 000	17	6,4	0,36	14-28	Case
T 46-2	25 x 16 x 10	26 x 15 x 12,5	30 000	17	6,4	0,36	14-28	Epoxy
T 46-3	25 x 16 x 10	27,5 x 13,5 x 12,5	55 000	17	6,4	0,36	28-49	Case
T 46-4	25 x 16 x 10	26 x 15 x 12,5	55 000	17	6,4	0,36	28-49	Epoxy
T 46-5	25 x 16 x 10	27,5 x 13,5 x 12,5	>70 000	17	6,4	0,36	>49	Case
T 46-6	25 x 16 x 10	26 x 15 x 12,5	>70 000	17	6,4	0,36	>49	Epoxy
T 47-1	30 x 20 x 10	32,5 x 18 x 12,5	30 000	23	7,8	0,39	13-26	Case
T 47-2	30 x 20 x 10	31x 19x 11	30 000	23	7,8	0,39	13-26	Epoxy
T 47-3	30 x 20 x 10	32,5 x 18 x 12,5	55 000	23	7,8	0,39	26-45	Case
T 47-4	30 x 20 x 10	31x 19x 11	55 000	23	7,8	0,39	26-45	Epoxy
T 47-5	30 x 20 x 10	32,5 x 18 x 12,5	>70 000	23	7,8	0,39	>45	Case
T 47-6	30 x 20 x 10	31x 19x 11	>70 000	23	7,8	0,39	>45	Epoxy
N2-1	35 x 25 x 15	41 x 21 x 16	30 000	41	9,4	0,6	16-32	Case
N2-2	35 x 25 x 15	36 x 24 x 16	30 000	41	9,4	0,6	16-32	Epoxy
N2-3	35 x 25 x 15	41 x 24 x 16	55 000	41	9,4	0,6	32-46	Case
N2-4	35 x 25 x 15	36 x 24 x 16	55 000	41	9,4	0,6	32-46	Epoxy
N2-5	35 x 25 x 15	41 x 24 x 16	>70 000	41	9,4	0,6	>46	Case
N2-6	35 x 25 x 15	36 x 24 x 16	>70 000	41	9,4	0,6	>46	Epoxy
N3-1	40 x 25 x 15	41 x 24 x 16	30 000	67,1	10,2	0,9	22-44	Case
N3-2	40 x 25 x 15	41 x 24 x 16	30 000	67,1	10,2	0,9	22-44	Epoxy
N3-3	40 x 25 x 15	41 x 21 x 16	55 000	67,1	10,2	0,9	44-77	Case
N3-4	40 x 25 x 15	41 x 24 x 16	55 000	67,1	10,2	0,9	44-77	Epoxy
N3-5	40 x 25 x 15	41 x 21 x 16	>70 000	67,1	10,2	0,9	>77	Case
N3-6	40 x 25 x 15	41 x 24 x 16	>70 000	67,1	10,2	0,9	>77	Epoxy

A_{Fe} : Effective core cross section

L_{Fe} : Mean core path length

AI : single turn inductance (in μ H at 10kHz)

Large Nanophy® cores :



Name	Core dimensions Dext x Dint x height (in mm)	Finished dimensions Dext x Dint x height (in mm)	Permeability μ (at 10kHz)	Weight g	L_{Fe} cm	A_{Fe} cm ²	AI μH at 10kHz	Design
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N4-1	40 x 30 x 20	41x 29 x 21	30 000	64,2	11	0,8	18-37	Epoxy
N4-2	40 x 30 x 20	41x 29 x 21	55 000	64,2	11	0,8	37-64	Epoxy
N4-3	40 x 30 x 20	41x 29 x 21	>70 000	64,2	11	0,8	>64	Epoxy
N5-1	63 x 43 x 15	64 x 42 x 16	30 000	146	16,6	1,2	18-36	Epoxy
N5-2	63 x 43 x 15	64 x 42 x 16	55 000	146	16,6	1,2	36-63	Epoxy
N5-3	63 x 43 x 15	64 x 42 x 16	>70 000	146	16,6	1,2	>63	Epoxy
N5-4	Oval (63 x 43 x 15)	Oval (64 x 42 x 16)	>30 000	146	16,6	1,2	>18	Epoxy
N6-1	63 x 43 x 20	64 x 42 x 21	30 000	195	16,6	1,6	24-48	Epoxy
N6-2	63 x 43 x 20	64 x 42 x 21	55 000	195	16,6	1,6	48-85	Epoxy
N6-3	63 x 43 x 20	64 x 42 x 21	>70 000	195	16,6	1,6	>85	Epoxy
N7-1	63 x 43 x 30	64 x 42 x 31	30 000	292	16,6	2,4	36-72	Epoxy
N7-2	63 x 43 x 30	64 x 42 x 31	55 000	292	16,6	2,4	72-127	Epoxy
N7-3	63 x 43 x 30	64 x 42 x 31	>70 000	292	16,6	2,4	>127	Epoxy
N8-1	76,5 x 50 x 20	77,5 x 49 x 21	30 000	308	19,9	2,12	27-54	Epoxy
N8-2	76,5 x 50 x 20	77,5 x 49 x 21	55 000	308	19,9	2,12	54-94	Epoxy
N8-3	76,5 x 50 x 20	77,5 x 49 x 21	>70 000	308	19,9	2,12	>94	Epoxy
N9-1	76,5 x 50 x 30	77,5 x 49 x 31	30 000	461	19,9	3,18	40-80	Epoxy
N9-2	76,5 x 50 x 30	77,5 x 49 x 31	55 000	461	19,9	3,18	80-140	Epoxy
N9-3	76,5 x 50 x 30	77,5 x 49 x 31	>70 000	461	19,9	3,18	>140	Epoxy
N10-1	120 x 108 x 15	121 x 107 x 16	50 000	188	35,8	0,72	5-17	Epoxy
N10-2	120 x 108 x 20	121 x 107 x 21	50 000	251	37,8	1	6-24	Epoxy
N10-3	120 x 108 x 30	121 x 107 x 31	50 000	377	37,8	1,4	10-35	Epoxy
N12-1	130 x 100 x 25	131 x 99 x 26	50 000	800	36,1	3	21-73	Epoxy
N12-2	130 x 100 x 50	131 x 99 x 51	50 000	1 600	36,1	6	42- 146	Epoxy
N11-1	160 x 130 x 15	161 x 129 x 16	50 000	600	45,5	1,8	10-35	Epoxy
N11-2	160 x 130 x 20	161 x 129 x 21	50 000	800	45,5	2,4	13-46	Epoxy
N11-3	160 x 130 x 30	161 x 129 x 31	50 000	1 200	45,5	3,6	20-70	Epoxy
N11-4	160 x 130 x 50	161 x 129 x 51	50 000	2 000	45,5	6	33-116	Epoxy
N11-5	Oval (160 x 130 x 15)	Oval (161 x 131 x 16)	50 000	600	45,5	1,8	10-35	Epoxy
N11-6	Oval (160 x 130 x 50)	Oval (161 x 131 x 51)	50 000	2 000	45,5	6	33-116	Epoxy

For each core dimensions, depending on your needs in application, the core permeability is designed between 20 000 and more than 200 000. Mécagis brings help in designing component.

New ! : In addition to this catalogue, we manufacture **nanocrystalline cores** with height up to **60mm!**