TAPE WOUND CORES

48 Alloy | Orthonol | Magnesil | Permalloy 80 | Supermalloy

Visit Magnetics' websites for a wealth of easy to access information on soft magnetic cores and materials…

All product specifications for Magnetics' Ferrite Cores, Powder Cores and Tape Wound Cores can be found quickly by using the menu driven product locator.

Magnetics' Digital Library contains all of the company's technical bulletins, white papers and design manuals, which can be viewed on-screen or downloaded.

The Software section of the website provides access to the Magnetics' software design aids for designing Common Mode Filters, Current Transformers, Inductors and MagAmps.

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HISTORY OF THE STRIP WOUND CORE

Magnetics Pioneered Strip Wound Cores.

Magnetics was established in 1949 when the commercial market for high permeability magnetic materials was virtually non-existent and development in this field was just taking root. The new simplicity and reliability with which magnetic components could be used opened many doors in the field of electronics. Magnetics was quickly positioned as a leader in this field and has remained so ever since.

The first tape cores were used in applications where they were superior to the fragile vacuum tubes. Tape wound core applications grew rapidly because these new magnetic components performed far better due to the inherent reliability and robustness of tape cores compared with vacuum tubes. They contained no parts to wear or burn out; and the effects of shock, vibration and temperature were small compared to other components. Tape cores also made it possible to build circuits that included electrical isolation or multiple-signal inputs whereas existing technologies at the time could not.

Today, Strip Wound Cores are used in magnetic amplifiers, reactors, regulators, static magnetic devices, current transformers, magnetometers, flux gates, oscillators, and inverters.

ABOUT MAGNETICS

Magnetics offers the confidence of over fifty years of expertise in the research, design, manufacture and support of high-quality magnetic materials and components.

A major supplier of the highest performance materials in the industry including: AmoFlux®, XFlux®, MPP, High Flux, Kool Mμ®, power Ferrites, high permeability Ferrites and Strip Wound Cores, Magnetics' products set the standard for providing consistent and reliable electrical properties for a comprehensive range of core materials and geometries. Magnetics cores are the best choice for a variety of applications including switched mode power supplies for telecommunications equipment, servers, and computers; Uninterruptible Power Supplies for datacenters; and inverters for renewable energy.

Magnetics backs its products with unsurpassed technical expertise and support. Magnetics' Sales Engineers offer the experience necessary to assist the designer from the initial design phase through prototype approval. Knowledgeable Sales Managers provide dedicated account management. Skilled Customer Service Representatives are easily accessible to provide exceptional sales support. In addition, Magnetics offers MyMagnetics, a self-service website, that provides 24-hour secure access to price, inventory availability, tracking, account information, and online purchasing. This support, combined with a global presence via a worldwide distribution network, including a Hong Kong distribution center, makes Magnetics a superior supplier to the international electronics industry.

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Magnetics offers soft magnetic core materials for saturating devices and high sensitivity magnetic circuits for all applications. These materials are especially selected and processed to meet exacting magnetic circuit requirements, and are manufactured to tight guaranteed tolerances according to IEEE test procedures or other common industry test methods.

SQUARE ORTHONOL

(MATERIAL CODE A)

This material, a grain-oriented 50% nickel-iron alloy, is manufactured to meet exacting circuit requirements for very high squareness and high core gain, and is usually used in saturable reactors, high gain magnetic amplifiers, bistable switching devices, and power inverter-converter applications. Other applications such as time delays, flux counters and transductors demanding extremely square hysteresis loops require selection of Square Orthonol.

SQUARE PERMALLOY 80

(MATERIAL CODE D)

This material, a non-oriented 80% nickel-iron alloy, is manufactured to meet the high squareness and high core gain requirements of magnetic preamplifiers and modulators. It is especially useful in converters and inverters where high voltage at low power levels is required, but where circuit losses must be kept to a minimum. Square Permalloy 80 has a saturation flux density approximately one-half that of the Orthonol's, but has coercive force values one-fifth to one-seventh that of the 50% oriented nickel-iron alloys.

SUPERMALLOY

(MATERIAL CODE F)

This material is a specially processed 80% nickel-iron alloy. It is manufactured to develop the ultimate in high initial permeability and low losses. Initial permeability ranges from 40,000 to 100,000 while the coercive force is about one-third that of Square Permalloy 80. Supermalloy is very useful in ultra sensitive transformers, especially pulse transformers, and ultra sensitive magnetic amplifiers where low loss is mandatory.

48 ALLOY

(MATERIAL CODE H)

This material, a 50% nickel-iron alloy, has a round B-H loop and exhibits lower saturation flux density, squareness, coercive force, and core gain than the Orthonol types. It is useful in devices requiring lower coercive force such as special transformers, saturable reactors, and proportioning magnetic amplifiers. AC core losses are lower than with Orthonol.

MAGNESIL

(MATERIAL CODE K)

This material, a grain-oriented 3% silicon-iron alloy, is processed and annealed to develop high squareness and low core loss. It is usually used in high quality toroidal power transformers, current transformers and high power saturable reactors and magnetic amplifiers. It exhibits high saturation flux density with high squareness but has comparatively high coercive force and core loss. With its high Curie temperature, it is quite useful in magnetic devices which are to be exposed to temperatures between 200ºC (392ºF) and 500ºC (932ºF). At higher temperatures, only uncased cores should be used due to case temperature limitations.

ROUND PERMALLOY 80

(MATERIAL CODE R)

This material, a non-oriented 80% nickel-iron alloy, is processed to develop high initial permeability and low coercive force. It has lower squareness and core gain than the square type, as these characteristics are sacrificed to produce the high initial permeability and low coercive force properties. Round Permalloy 80 is especially useful in designing highly sensitive input and inter-stage transformers where signals are extremely low and DC currents are not present. It is also useful in current transformers where losses must be kept to a minimum and high accuracy is a necessity. The initial permeability of this material is usually between 20,000 and 50,000.

Table 1

TYPICAL PROPERTIES OF MAGNETIC ALLOYS			
PROPERTY	3% Si-Fe Alloys (K)	50% Ni-Fe Alloys (A, H)	80% Ni-Fe Alloys (R, D, F)
% Iron	97	50	17
% Nickel	....	50	79
% Silicon	3	....	....
% Molybdenum	....	....	4
Density (gms/cm^3)	7.65	8.2	8.7
Melting Point (ºC)	1,475	1,425	1,425
Curie Temperature (ºC)	750	500	460
Specific Heat (Cal./ºCgm)	0.12	0.12	0.118
Resistivity (μ Ω -cm)	50	45	57
CTE (x10^{-6}/ºC)	12	5.8	12.9
Rockwell Hardness	B-84	B-90	B-95

Table 2

MAGNETIC CHARACTERISTICS COMPARISON*

Material Code	Material	Flux Density		B_r/B_m	Coercive Force 400 Hertz CCFR **	
		(kG)	(Teslas)		Oersteds	A/M
A	Square Orthonol	14.2 - 15.8	1.42 - 1.58	0.88 up	0.15 - 0.25	11.9 - 19.9
D	Square Permalloy 80	6.6 - 8.2	0.66 - 0.82	0.80 up	0.022 - 0.044	1.75 - 3.50
F	Supermalloy	6.5 - 8.2	0.65 - 0.82	0.40 - 0.70	0.004 - 0.015	0.32 - 1.19
H	48 Alloy	11.5 - 14.0	1.15 - 1.40	0.80 - 0.92	0.08 - 0.15	6.4 - 12.0
K	Magnesil	15.0 - 18.0	1.5 - 1.8	0.85 up	0.45 - 0.65	35.8 - 51.7
R	Round Permalloy 80	6.6 - 8.2	0.66 - 0.82	0.45 - 0.80	0.008 - 0.032	0.64 - 2.55

* The values listed are typical of 0.002" thick materials of the types shown. For guaranteed characteristics on all thicknesses of alloys available, contact Magnetics Sales Engineering Department.

** 400 Hertz CCFR Coercive Force is defined as the H_1 reset characteristic described by the Constant Current Flux Reset Test Method in IEEE Std. #393.

TAPE WOUND CORES

MAGNETICS Tape Wound Cores are made from high permeability magnetic strip alloys of nickel-iron (80% or 50% nickel), and silicon-iron.

Tape Wound Cores are produced with ODs ranging from 0.438" to 3" in many sizes.

Additional and custom box sizes are available.

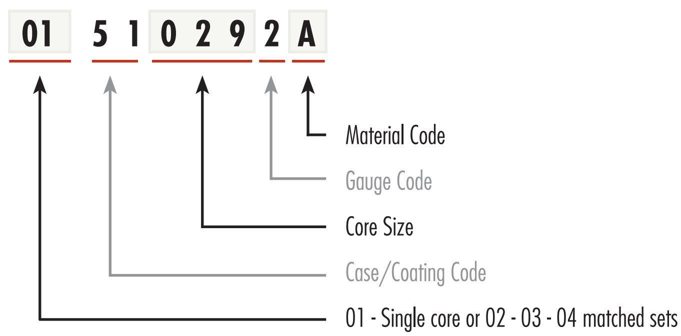
APPLICATIONS

Magnetics Tape Wound Cores are often key components of:

- > Aerospace
- > Radar Installations
- > Jet Engine Controls
- > Power Supplies
- > Current Transformers

HOW TO ORDER

Each core is coded by a part number that describes it in detail. A typical part number is:



Below is a quick reference for available combinations of materials, cases, and gauges.

Material Code	Material	Available Cases/Coatings*	Gauges (Thickness)			
			0.0005" (Gauge Code 5)	0.001" (Gauge Code 1)	0.002" (Gauge Code 2)	0.004" (Gauge Code 4)
A	Square Orthonol	50, 51, 52	X	X	X	X
D	Square Permalloy 80	50, 51, 52	X	X	X	X
F	Supermalloy	50, 51, 52	X	X	X	X
H	Alloy 48	50, 51, 52	X	X	X	X
K	Magnesil	50, 51, 52, 53, 54			X	X
R	Round Permalloy 80	50, 51, 52		X	X	X

*Cases/Coatings (Specifications on page 5)
50 series – cores in non-metallic cases (phenolic or nylon depending on availability)
51 series – cores in aluminum cases
52 series – cores in aluminum cases with epoxy coating
53 series – uncased/bare cores
54 series – encapsulated cores (red epoxy)

Five sizes of cores have been designed specifically to be used as magnetic amplifier cores. Mag Amp cores have been designed to serve as a regulator in the control loop or the secondary outputs of the switch-mode power supply.

Magnetics website, www.mag-inc.com, provides a software program to assist the designer with Mag-Amp design. Using the values of output current, secondary voltage, frequency, duty cycle and head room, the program software will select the appropriate core and calculate the losses and temperature rise of the Mag Amp design.

NON-METALLIC CASES

(CASE/COATING CODE 50)

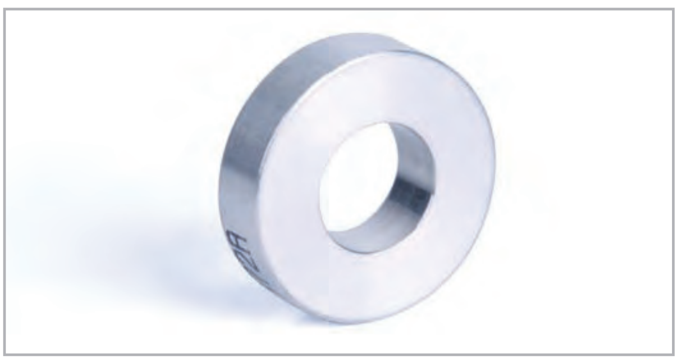
For superior electrical properties, improved wearing qualities, and high strength, non-metallic cases are widely used as protection for the core material against winding stresses and pressures. Both phenolic and nylon types meet a minimum voltage breakdown of 2000 volts wire-to-wire. The glass-filled nylon types can withstand temperatures to 200ºC (392ºF) without softening, while the phenolic materials will withstand temperatures up to 125ºC (257ºF).

UNCASED/BARE CORES

(CASE/COATING CODE 53)

Uncased cores offer a maximum window area. They also offer a slightly smaller package and lower cost where slight deterioration of properties after winding can be tolerated.

Because of the extreme sensitivity of nickel-iron cores to winding stresses and pressures, such cores are not available in an uncased state. Magnesil cores are not as susceptible to these pressures and are available without cases.



ALUMINUM CASES

(CASE/COATING CODE 51)

Aluminum core cases have great structural strength. A glass epoxy insert, to which the aluminum case is mechanically bonded, forms an airtight seal. These core cases will withstand temperatures to 200ºC (392ºF), a critical factor in designing for extreme environmental conditions.

ENCAPSULATED (RED EPOXY) CORES

(CASE/COATING CODE 54)

Encapsulated cores have a guaranteed minimum voltage breakdown of 1000 volts from core to winding. The temperature rating of this finish is 125ºC (257ºF).

Only Magnesil cores are available in encapsulated form. This protection is a tough, hard epoxy which adheres rigidly to the core, allowing the winder to wind directly over the core without prior taping. A smooth radius prevents wire insulation from damage.

ALUMINUM CASE WITH GVB EPOXY PAINT

(CASE/COATING CODE 52)

This case is the same basic construction as the aluminum box, but in addition it has a thin, epoxy-type, protective coating surrounding the case. This finish adds no more than 0.015" to the OD, subtracts no more than 0.015" from the ID, nor adds more than 0.020" to the height.

GVB epoxy paint finish offers a guaranteed minimum voltage breakdown of 2000 volts wire-to-wire. This coating will withstand temperatures as high as 200ºC (392ºF) and as low as -65ºC (-85ºF) with an operating life of greater than 20,000 hours.

TAPE CORE TESTING PARAMETERS

SQUARE B-H LOOP TAPE CORES

Square loop materials include oriented silicon iron, Magnesil, oriented 50% nickel, Orthonol, and 80% nickel, Permalloy, with a square loop anneal. These cores are tested by the Constant-Current Flux-Reset test method as defined by IEEE Standard #393 which measures 4 points on the BH loop as shown in Figure 1.

B_{max} – The saturation flux density is the flux density swing from the origin of the BH loop to the saturation in one direction.

B_m - B_r is the difference between the maximum flux density (B_m) and the residual flux density (B_r). The lower this number, the lower the permeability in saturation and the lower the switching losses for a given core material.

B_r/B_m – B_r residual flux density / B_m, (squareness) is calculated.

H_1 – The third parameter measured is the width of the hysteresis loop. The core is reset $^1/_3$ of the way down the loop from positive saturation to negative saturation. The loop width at this point is the $H_{1/3}$ point, given in Oersteds. The narrower the B/H loop, the lower will be the corresponding core losses.

Delta H – The last parameter that this test measures is Delta H, or the additional amount of DC current or ampereturns required to set the core from $BH_{1/3}$ down the loop to – $BH_{2/3}$. H is read in Oersteds and cores normally have a maximum Delta H limit.

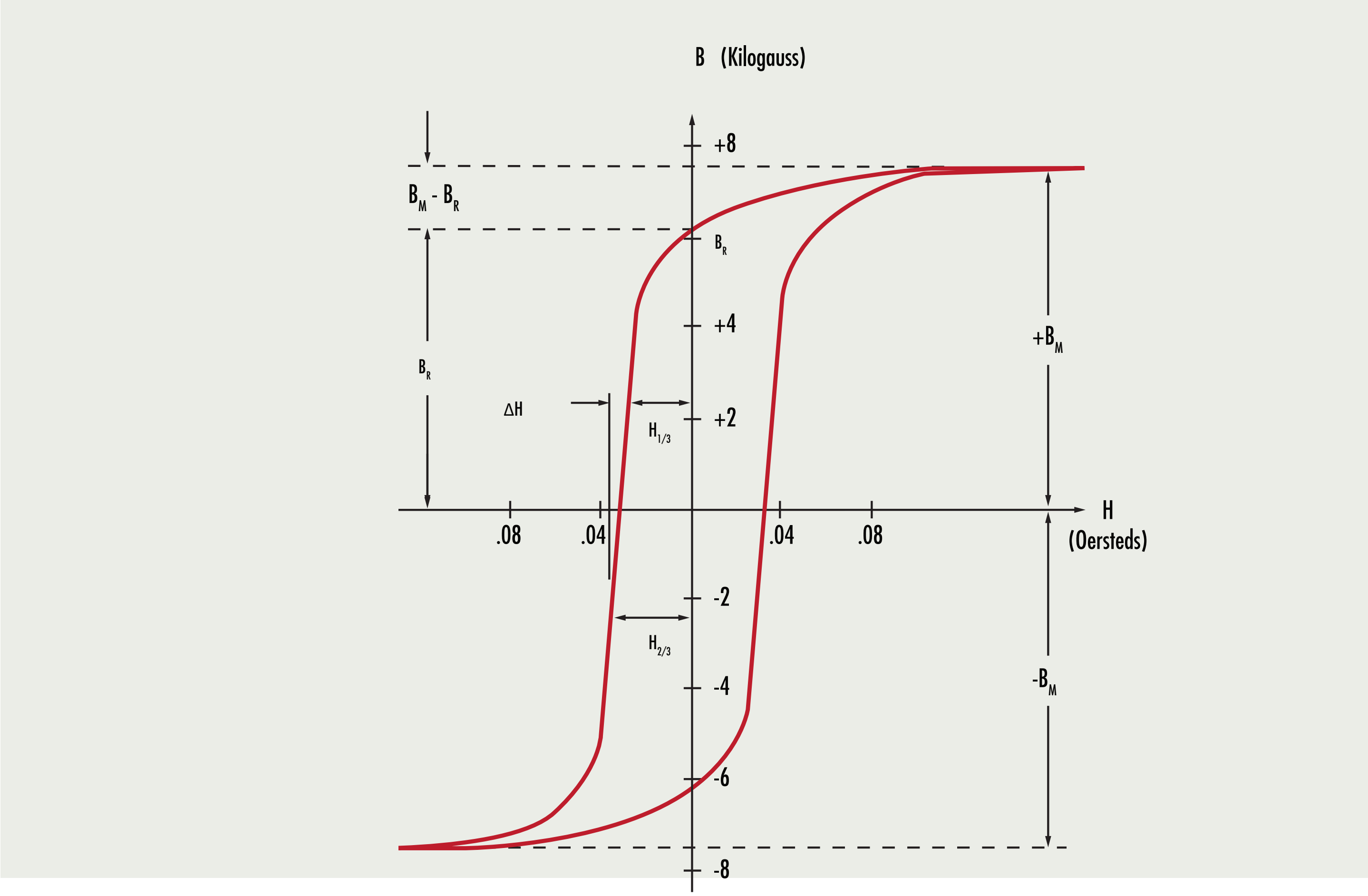
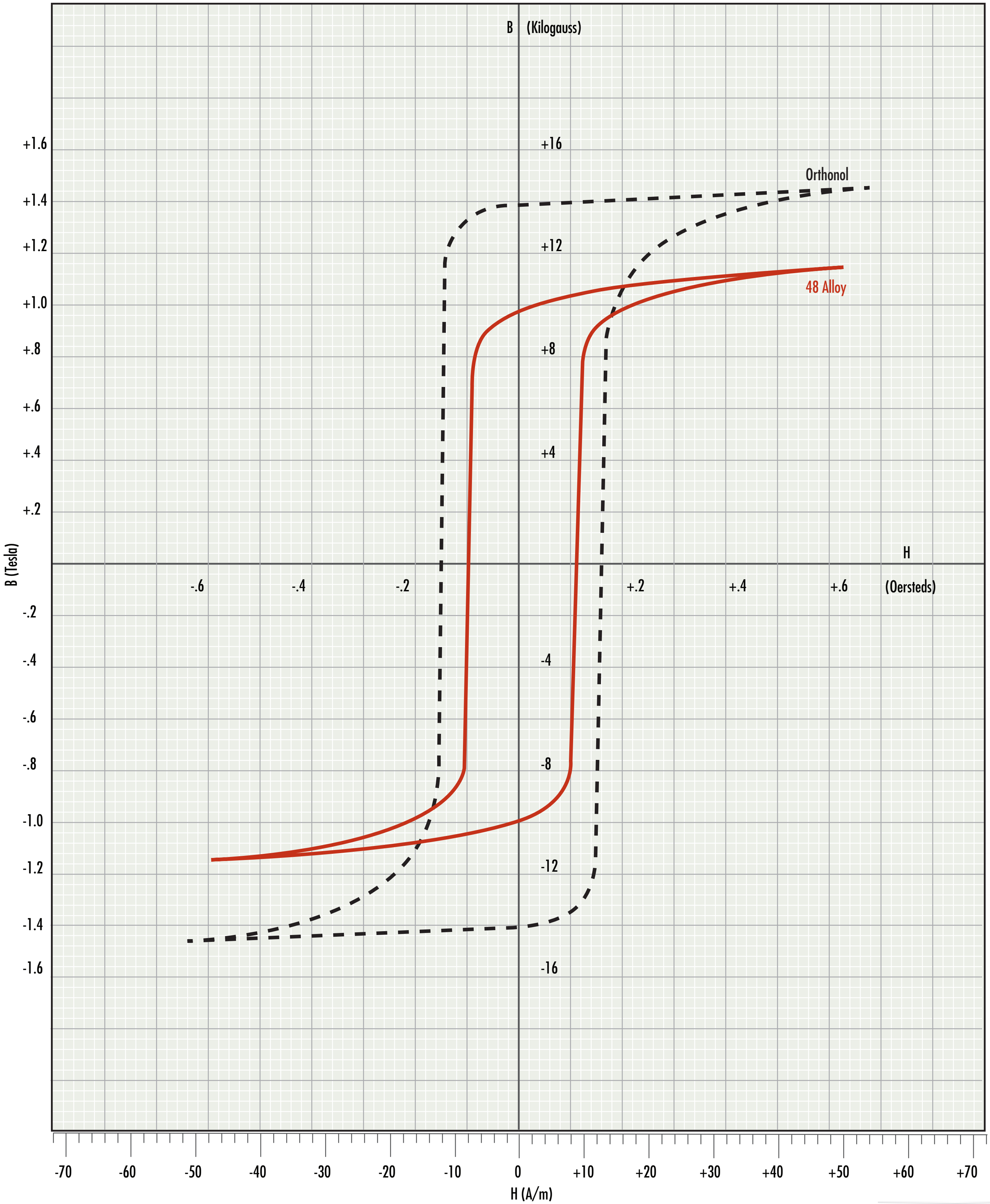
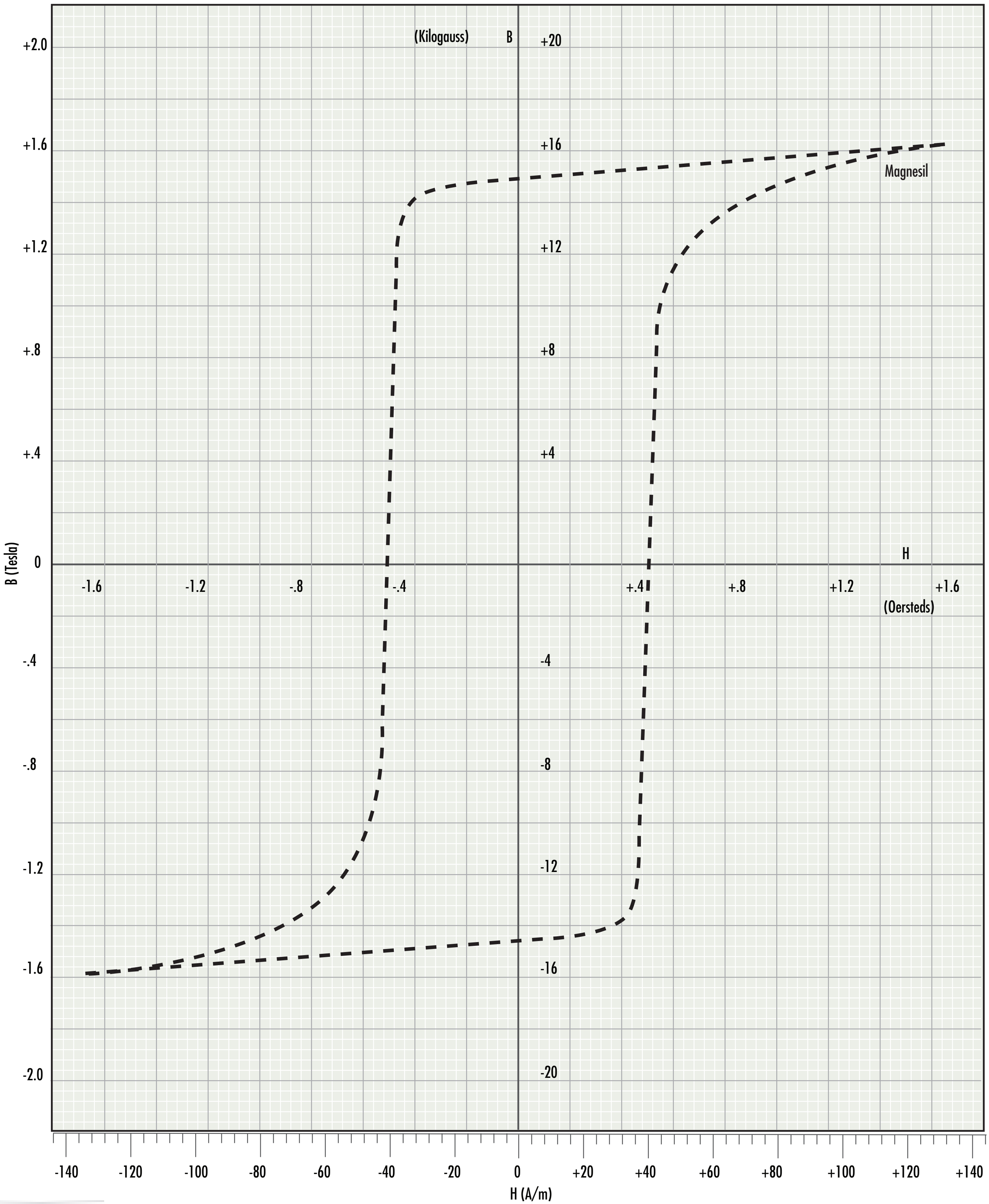


Figure 1. Standard DC Reset Tester Measurements

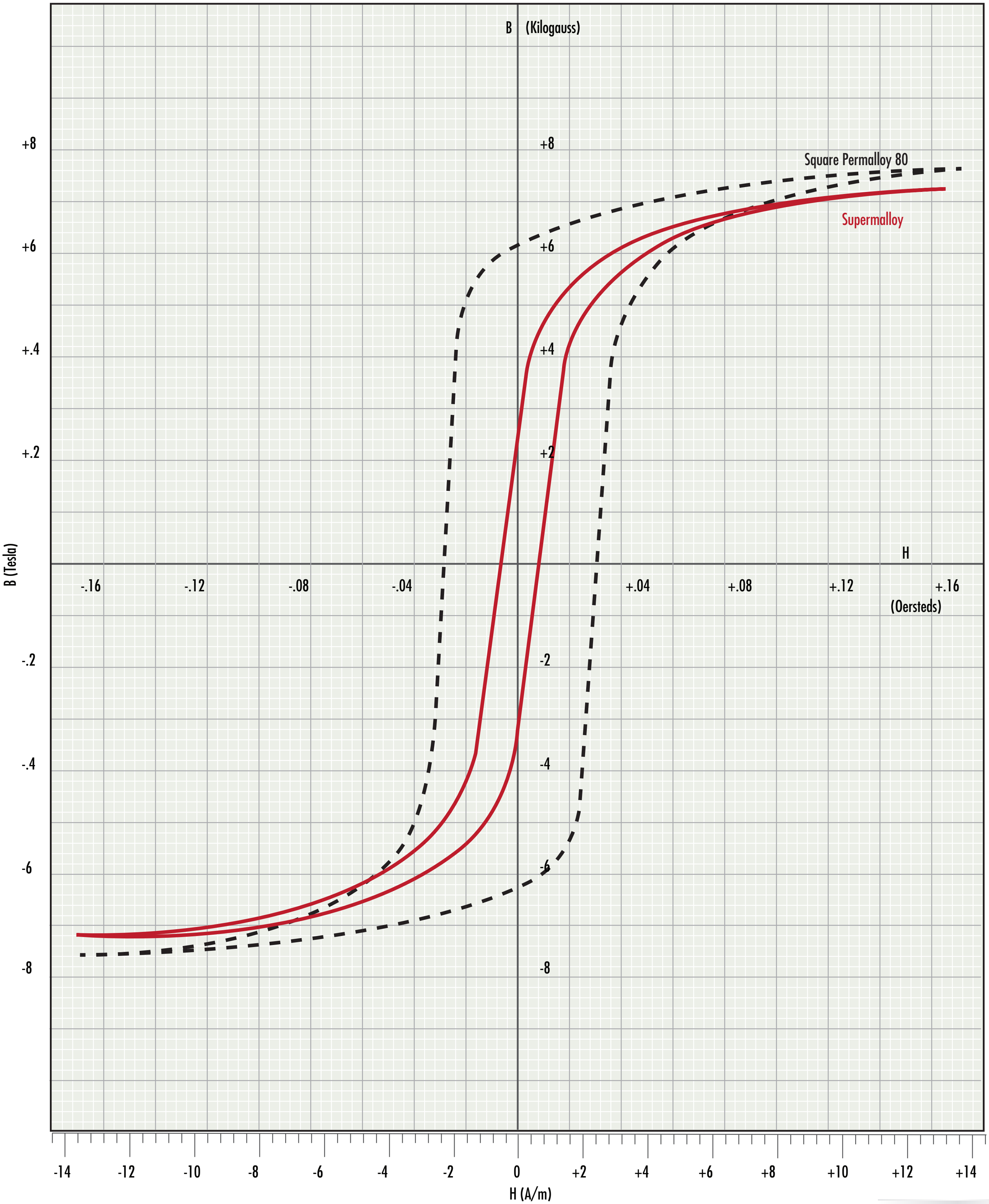
Typical Hysteresis Loops for 48 Alloy and Orthonol



Typical Hysteresis Loop for Magnesil

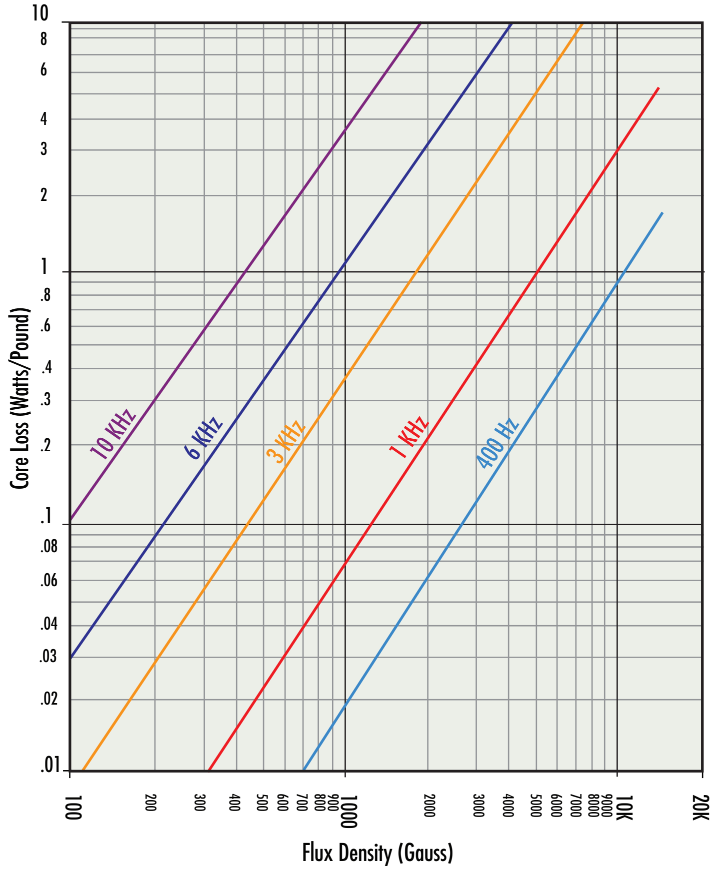


Typical Hysteresis Loops for Square Permalloy 80 and Supermalloy

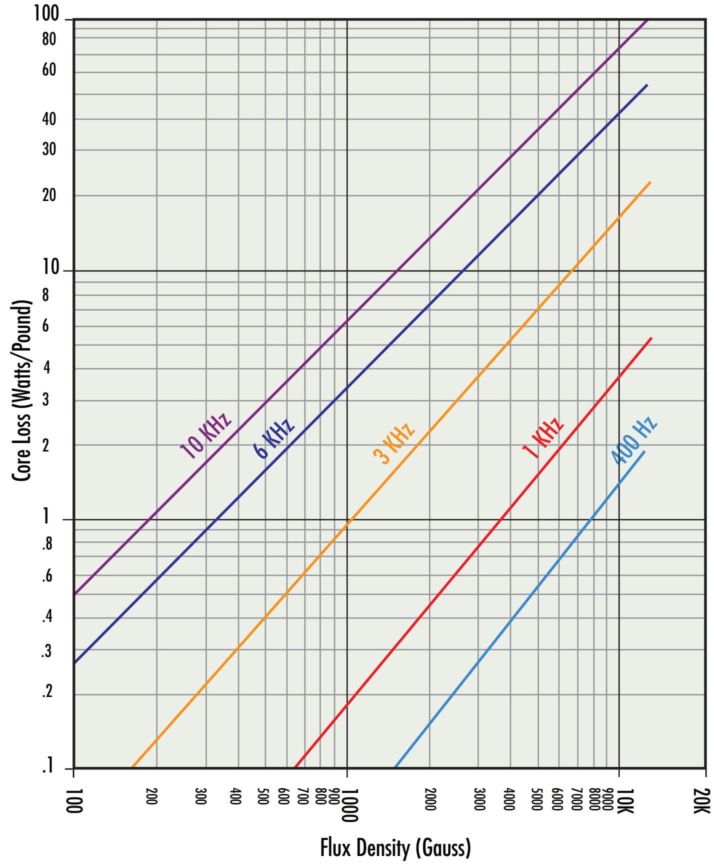


CORE LOSS vs. INDUCTION LEVEL

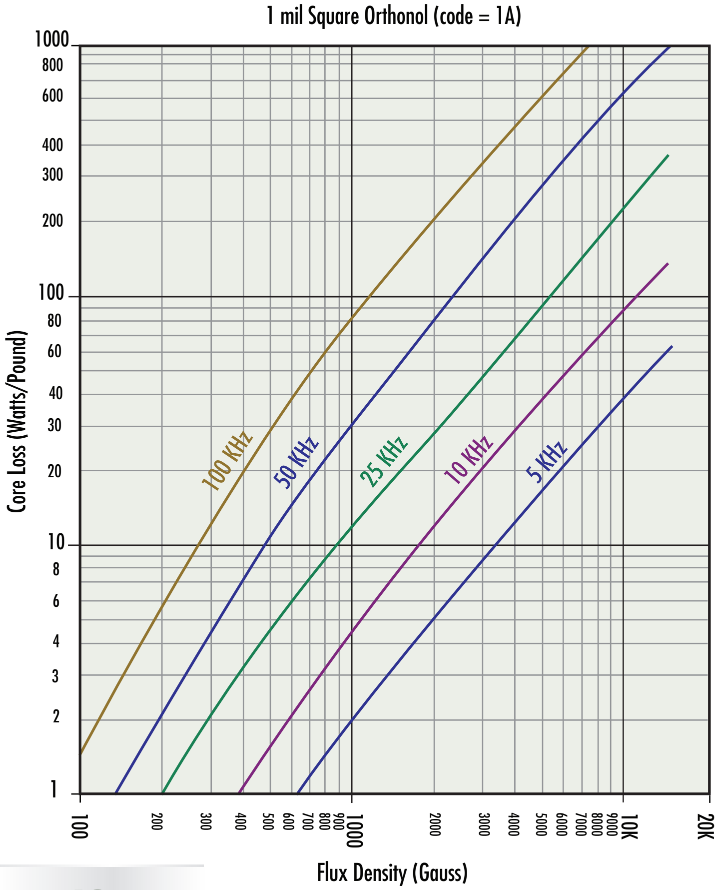
2 mil 48 Alloy (code = 2H)



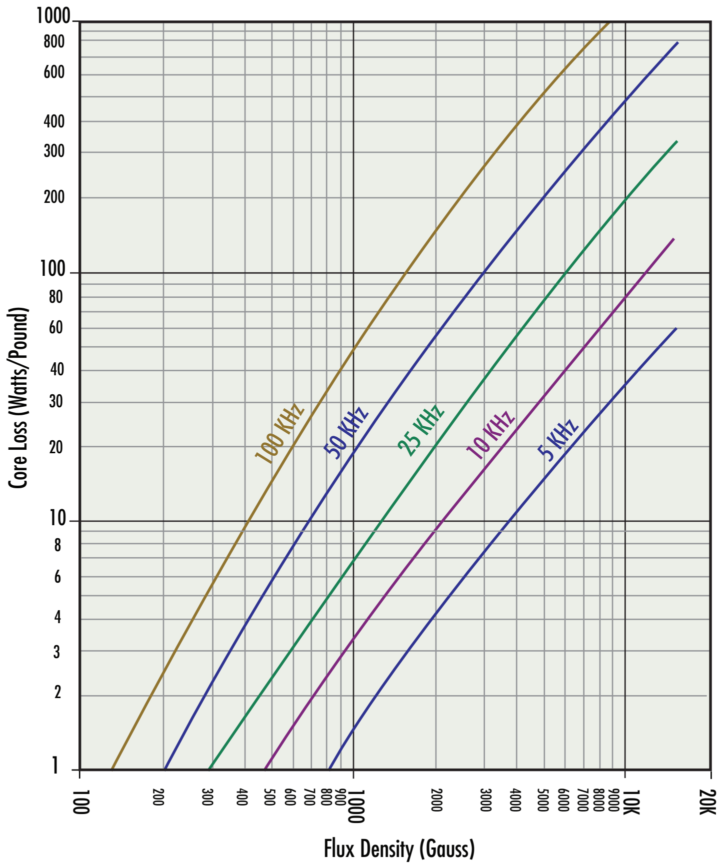
2 mil Square Orthonol (code = 2A)



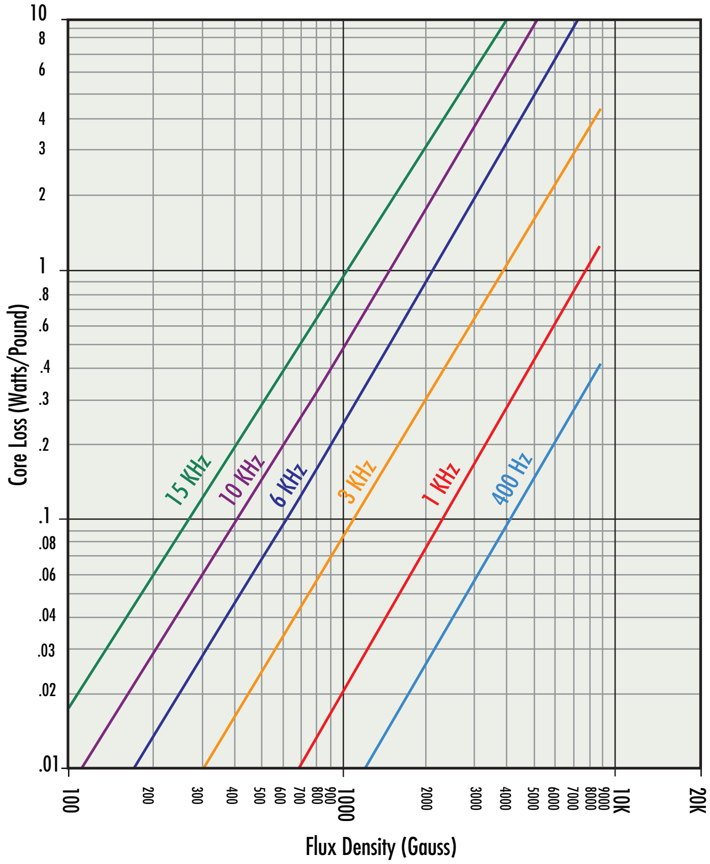
1 mil Square Orthonol (code = 1A)



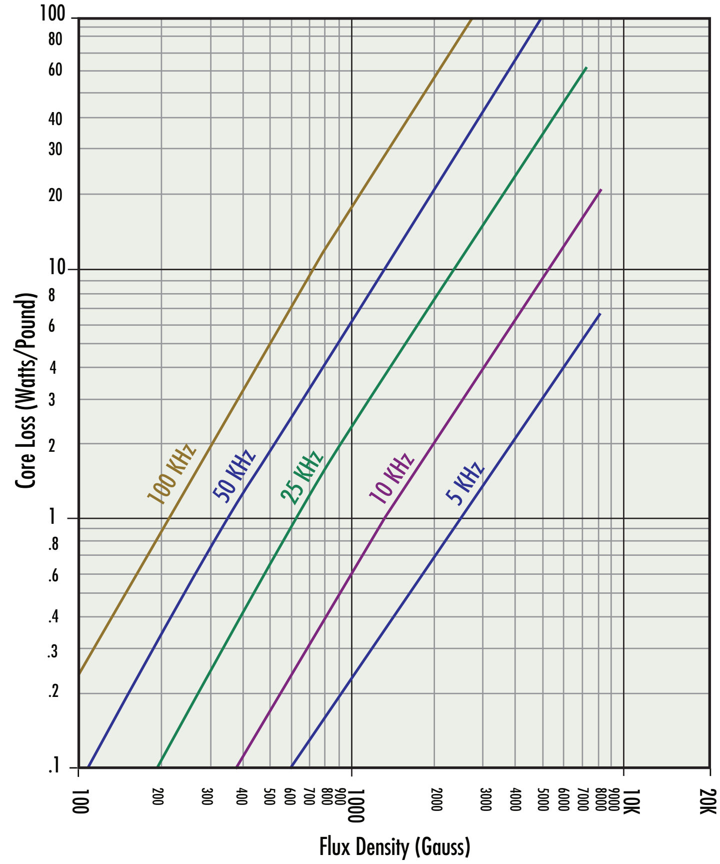
1/2 mil Square Orthonol (code = 5A)



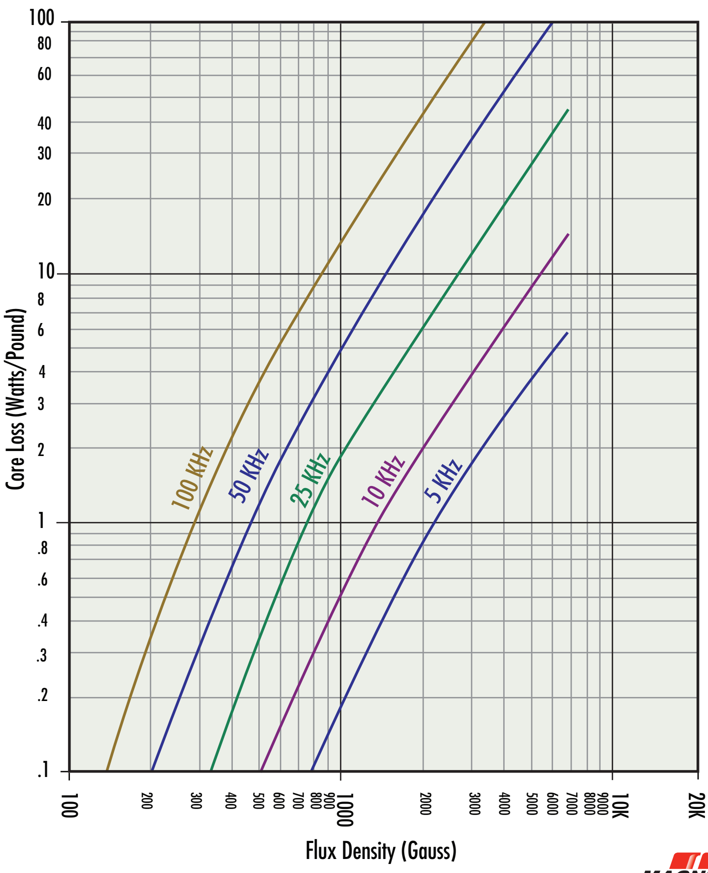
2 mil Square Permalloy 80 (code = 2D)



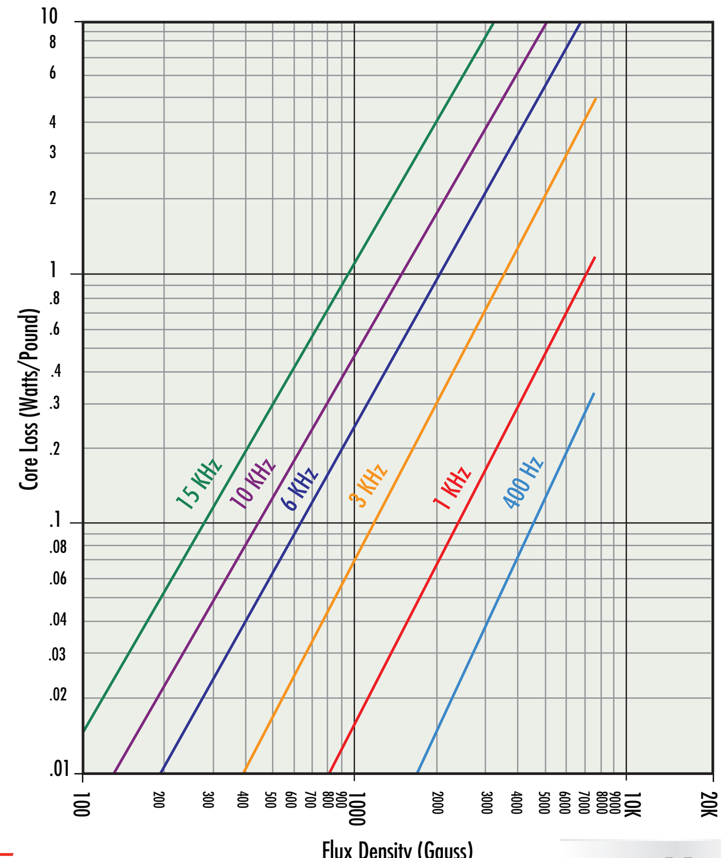
1 mil Square Permalloy 80 (code = 1D)



1/2 mil Square Permalloy 80 (code = 5D)

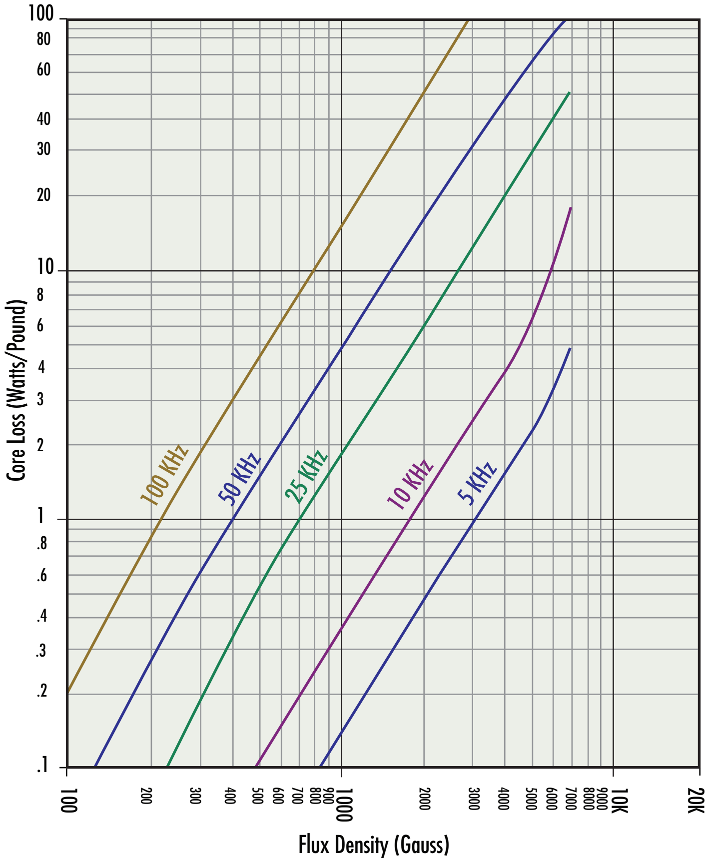


2 mil Supermalloy (code = 2F)

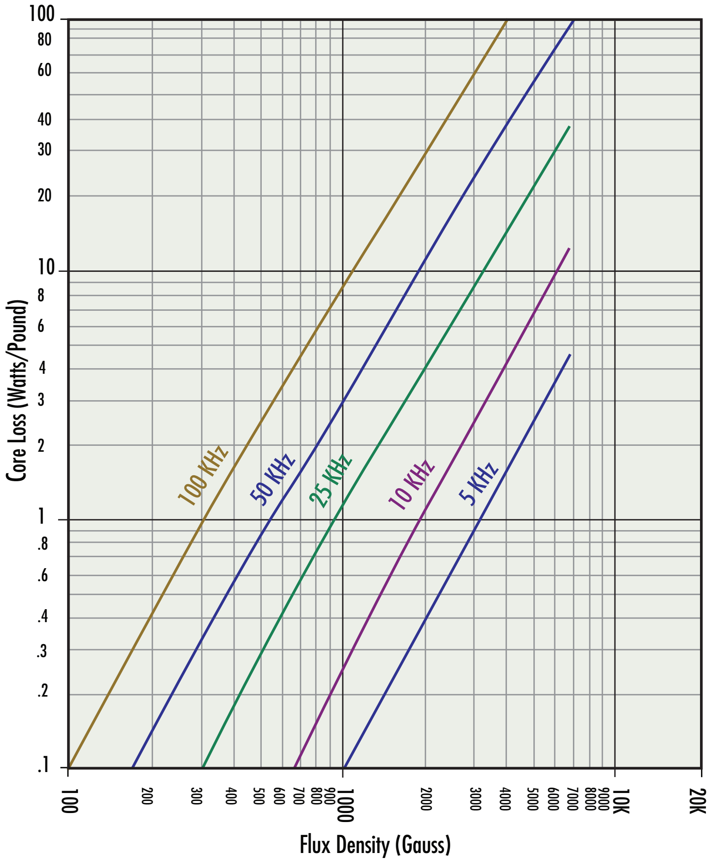


CORE LOSS vs. INDUCTION LEVEL

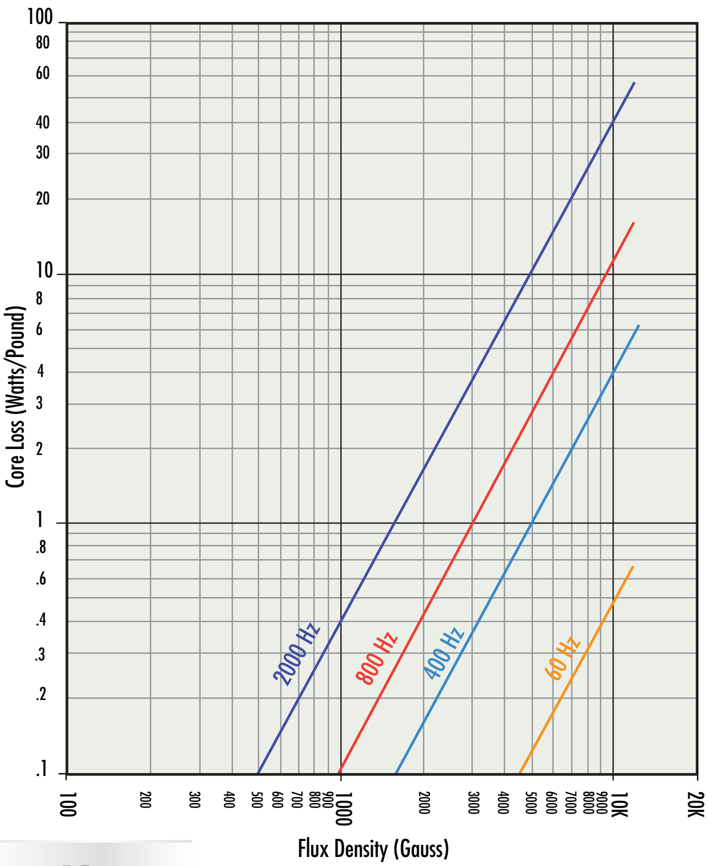
1 mil Supermalloy (code = 1F)



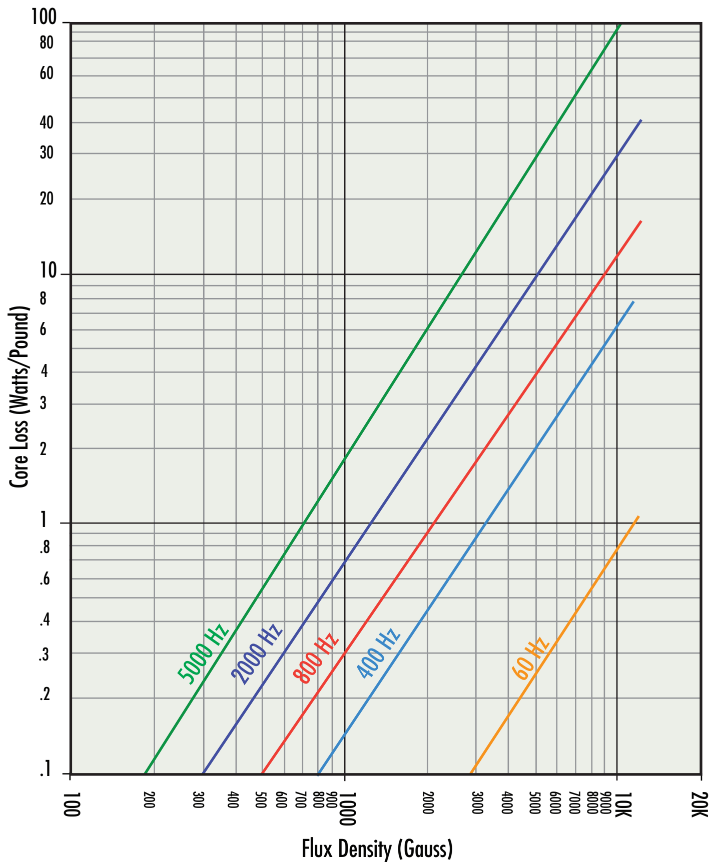
1/2 mil Supermalloy (code = 5F)



4 mil Magnesil (code = 4K)



2 mil Magnesil (code = 2K)



TAPE WOUND CORE SIZES

Tape Wound Core Sizes (By Effective Core Area)

CORE PART NUMBER		NOMINAL CORE DIMENSIONS			CASE DIMENSIONS (Nylon)			CASES AVAILABLE		Path Length cm	EFFECTIVE CORE AREA (cm^2)				Window Area cm^2	WaAc cm^4 2 mil material
		I.D.	O.D.	HT.	I.D. MIN	O.D. MAX	HT. MAX	Alumi-num	Nylon		0.0005″	0.001″	0.002″	0.004″		
50402	in. mm.	0.375 9.5	0.438 11.1	0.125 3.2	0.306 7.8	0.509 12.9	0.199 5.0	Yes	Yes	3.25	0.013	0.019	0.022	N/A	0.456	0.010
50107	in. mm.	0.500 12.7	0.563 14.3	0.125 3.2	0.432 11.0	0.632 16.0	0.199 5.0	Yes	Yes	4.24	0.013	0.019	0.022	0.023	0.916	0.020
50356	in. mm.	0.687 17.0	0.750 19.0	0.125 3.2	0.618 15.7	0.819 20.8	0.197 5.0	Yes	Yes	5.73	0.013	0.019	0.022	0.023	1.914	0.041
50153 50B12 Mag Amp	in. mm.	0.375 9.5	0.500 12.7	0.125 3.2	0.313 8.0	0.569 14.4	0.199 5.0	Yes	Yes	3.49	0.025	0.038	0.043	N/A	0.456	0.020
50154	in. mm.	0.438 11.1	0.563 14.3	0.125 3.2	0.369 9.4	0.632 16.0	0.199 5.0	Yes	Yes	3.99	0.025	0.038	0.043	N/A	0.673	0.030
50056 50B11 Mag Amp	in. mm.	0.500 12.7	0.625 15.9	0.125 3.2	0.431 10.9	0.694 17.6	0.199 5.0	Yes	Yes	4.49	0.025	0.038	0.043	0.045	0.916	0.041
50057	in. mm.	0.625 15.9	0.750 19.0	0.125 3.2	0.556 14.1	0.819 20.8	0.199 5.0	Yes	Yes	5.48	0.025	0.038	0.043	0.045	1.534	0.066
50155	in. mm.	0.438 11.1	0.563 14.3	0.250 6.4	0.369 9.4	0.632 16.0	0.324 8.2	Yes	Yes	3.99	0.050	0.076	0.086	N/A	0.724	0.061
50000 50B66 Mag Amp	in. mm.	0.500 12.7	0.750 19.0	0.125 3.2	0.431 10.9	0.819 20.8	0.199 5.0	Yes	Yes	4.99	0.050	0.076	0.086	0.091	0.916	0.081
50002 50B10 Mag Amp	in. mm.	0.650 16.5	0.900 22.9	0.125 3.2	0.581 14.8	0.969 24.6	0.199 5.0	Yes	Yes	5.98	0.050	0.076	0.086	0.091	1.676	0.142
50011	in. mm.	1.000 25.4	1.250 31.8	0.125 3.2	0.921 23.4	1.329 33.8	0.209 5.3	Yes	Yes	8.97	0.050	0.076	0.086	0.091	4.238	0.365
50748	in. mm.	2.500 63.5	2.750 69.9	0.125 3.2	2.389 60.7	2.869 72.9	0.247 6.3	Yes	Yes	20.94	0.050	0.076	0.086	0.091	29.407	2.53
50176 50B45 Mag Amp	in. mm.	0.500 12.7	0.750 19.0	0.250 6.4	0.431 10.9	0.819 20.8	0.324 8.2	Yes	Yes	4.99	0.101	0.151	0.171	0.182	0.916	0.157
50033	in. mm.	0.625 15.9	0.875 22.2	0.250 6.4	0.556 14.1	0.944 24.0	0.324 8.2	Yes	Yes	5.98	0.101	0.151	0.171	0.182	1.534	0.263
50061	in. mm.	0.750 19.0	1.000 25.4	0.250 6.4	0.671 17.0	1.079 27.4	0.334 8.5	Yes	Yes	6.98	0.101	0.151	0.171	0.182	2.273	0.390
50004	in. mm.	1.000 25.4	1.250 31.8	0.250 6.4	0.921 23.4	1.329 33.8	0.334 8.5	Yes	Yes	8.97	0.101	0.151	0.171	0.182	4.238	0.724
50076	in. mm.	0.625 15.9	1.000 25.4	0.188 4.8	0.546 13.9	1.079 27.4	0.272 6.9	Yes	Yes	6.48	0.113	0.171	0.193	0.205	1.478	0.284
50106	in. mm.	0.750 19.0	1.125 28.6	0.188 4.8	0.671 17.0	1.204 30.6	0.272 6.9	Yes	Yes	7.48	0.113	0.171	0.193	0.205	2.273	0.441
50296	in. mm.	0.600 15.2	0.900 22.9	0.250 6.4	0.531 13.5	0.969 24.6	0.324 8.2	Yes	Yes	5.98	0.121	0.182	0.206	N/A	1.478	0.304
50323	in. mm.	2.500 63.5	2.800 71.1	0.250 6.4	2.329 59.2	2.971 75.5	0.410 10.4	No	Yes	21.14	0.121	0.182	0.206	0.218	29.407	6.06
50007	in. mm.	0.625 15.9	1.000 25.4	0.250 6.4	0.546 13.9	1.079 27.4	0.334 8.5	Yes	Yes	6.48	0.151	0.227	0.257	0.272	1.478	0.380
50084	in. mm.	0.750 19.0	1.125 28.6	0.250 6.4	0.671 17.0	1.204 30.6	0.329 8.4	Yes	Yes	7.48	0.151	0.227	0.257	0.272	2.273	0.582
50029	in. mm.	1.000 25.4	1.375 34.9	0.250 6.4	0.901 22.9	1.474 37.4	0.354 9.0	Yes	Yes	9.47	0.151	0.227	0.257	0.272	4.438	1.09
50168	in. mm.	0.750 19.0	1.000 25.4	0.375 9.5	0.671 17.0	1.079 27.4	0.459 11.6	Yes	Yes	6.98	0.151	0.227	0.257	0.272	2.273	0.582

Note: Mag Amp cores available in 1 mil (0.001") Square Permalloy 80 - 1D and 1/2 mil (.0005") Square Permalloy 80 - 5D

CORE PART NUMBER		NOMINAL CORE DIMENSIONS			CASE DIMENSIONS (Nylon)			CASES AVAILABLE		Path Length cm	EFFECTIVE CORE AREA (cm^2)				Window Area cm^2	WaAc cm^4 2 mil material
		I.D.	O.D.	HT.	I.D. MIN	O.D. MAX	HT. MAX	Alumi-num	Nylon		0.0005″	0.001″	0.002″	0.004″		
50032	in mm.	1.000 25.4	1.500 38.1	0.250 6.4	0.901 22.9	1.599 40.6	0.354 9.0	Yes	Yes	9.97	0.202	0.303	0.343	0.363	4.238	1.45
50030	in. mm.	1.250 31.8	1.750 44.4	0.250 6.4	1.149 29.2	1.851 47.0	0.357 9.1	Yes	Yes	11.96	0.202	0.303	0.343	0.363	6.815	2.24
50391	in. mm.	1.000 25.4	1.250 31.8	0.500 12.7	0.906 23.0	1.344 34.1	0.599 15.2	No	Yes	8.97	0.202	0.303	0.343	0.363	4.435	1.52
50094	in. mm.	0.625 15.9	1.000 25.4	0.375 9.5	0.546 13.9	1.079 27.4	0.459 11.6	Yes	Yes	6.48	0.224	0.340	0.386	0.408	1.534	0.592
50034	in. mm.	0.750 19.0	1.125 28.6	0.375 9.5	0.671 17.0	1.204 30.6	0.459 11.6	Yes	Yes	7.48	0.224	0.340	0.386	0.408	2.273	0.876
50181	in. mm.	0.875 22.2	1.250 31.8	0.375 9.5	0.796 20.2	1.329 33.8	0.459 11.6	Yes	Yes	8.47	0.224	0.340	0.386	0.408	3.160	1.22
50504	in. mm.	1.125 28.6	1.500 38.1	0.375 9.5	1.036 26.3	1.599 40.6	0.479 12.2	Yes	Yes	10.47	0.224	0.340	0.386	0.408	5.478	2.12
50133	in. mm.	0.650 16.5	1.150 29.2	0.375 9.5	0.571 14.5	1.229 31.2	0.459 11.6	Yes	Yes	7.18	0.299	0.454	0.514	0.545	1.676	0.861
50188	in. mm.	0.750 19.0	1.250 31.8	0.375 9.5	0.671 17.0	1.329 33.8	0.459 11.6	Yes	Yes	7.98	0.299	0.454	0.514	0.545	2.238	1.15
50383	in. mm.	0.875 22.2	1.375 34.9	0.375 9.5	0.776 19.7	1.474 37.4	0.479 12.2	Yes	Yes	8.97	0.299	0.454	0.514	0.545	3.160	1.63
50026	in. mm.	1.000 25.4	1.500 38.1	0.375 9.5	0.901 22.9	1.599 40.6	0.479 12.2	Yes	Yes	9.97	0.299	0.454	0.514	0.545	4.238	2.18
50038	in. mm.	1.000 25.4	1.500 38.1	0.500 12.7	0.901 22.9	1.599 40.6	0.604 15.3	Yes	Yes	9.97	0.398	0.605	0.689	0.726	4.238	2.91
50035	in. mm.	1.250 31.8	1.750 44.4	0.500 12.7	1.149 29.2	1.851 47.0	0.607 15.4	Yes	Yes	11.96	0.398	0.605	0.689	0.726	6.815	4.67
50055	in. mm.	1.500 38.1	2.000 50.8	0.500 12.7	1.401 35.6	2.099 53.3	0.604 15.3	Yes	Yes	13.96	0.398	0.605	0.689	0.726	9.924	6.81
50345	in. mm.	1.750 44.4	2.250 57.2	0.500 12.7	1.619 41.1	2.381 60.5	0.627 15.9	Yes	Yes	15.95	0.398	0.605	0.689	0.726	13.787	9.46
50017	in. mm.	2.000 50.8	2.500 63.5	0.500 12.7	1.869 47.5	2.631 66.8	0.627 15.9	Yes	Yes	17.95	0.398	0.605	0.689	0.726	18.182	12.5
50425	in. mm.	1.250 31.80	2.000 50.8	0.375 9.5	1.134 28.8	2.116 53.7	0.492 12.5	Yes	Yes	12.96	0.448	0.681	0.771	0.817	6.815	5.26
50555	in. mm.	1.250 31.8	2.250 57.1	0.500 12.7	1.119 28.4	2.381 60.5	0.627 15.9	Yes	Yes	13.96	0.796	1.210	1.371	1.452	6.699	9.19
50001	in. mm.	1.500 38.1	2.500 63.5	0.500 12.7	1.369 34.8	2.631 66.8	0.627 15.9	Yes	Yes	15.95	0.796	1.210	1.371	1.452	9.640	13.2
50103	in. mm.	2.000 50.8	3.000 76.2	0.500 12.7	1.869 47.5	3.131 79.5	0.627 15.9	Yes	Yes	19.94	0.796	1.210	1.371	1.452	17.894	24.5
50128	in. mm.	2.5 63.5	3.5 88.8	0.500 12.7	2.369 60.2	3.631 92.2	0.627 15.9	Yes	Yes	23.93	0.796	1.210	1.371	1.452	28.678	39.3

TRANSFORMER DESIGN

60 Hz-300 kHz *MATERIAL AND CORE SELECTION*

Design to achieve:
Minimum size and weight. Maximum Efficiency. Minimize cost.

1 From the operating specifications determine the following transformer specifications:
Operating frequency — **f in Hz**
V_p—Primary voltage in V_{rms} ; V_s—Secondary voltage in V_{rms}
I_p—Primary current in Amps; I_s—Secondary current in Amps

2 Select a wire gauge to support the RMS current in the primary and secondary.
See the wire table page 22.
Take note of the wire area A_w in cm^2

3 Select the proper material and thickness based upon the frequency of operation.

Materials	Saturation Flux Density in Tesla	Curie Temp. °C	Tape Thickness	Frequency of Operation
Square Permalloy D 79% Ni 4% Mo 17% Fe	0.66 – 0.82 T	460 °C	.0005" .001" .002" .004"	40 kHz 20 kHz 10 khz 5 kHz
Round Permalloy R 79% Ni 4% Mo 17% Fe	0.66 – 0.82 T	460 °C	.001" .002" .004"	20 kHz 10 khz 5 kHz
Supermalloy F 79% Ni 4% Mo 17% Fe	0.65 – 0.82 T	460 °C	.0005" .001" .002" .004"	80 kHz 50 kHz 25 khz 10 kHz
Magnesil K 97% Fe 3% Si	1.50 – 1.80 T	750 °C	.001" .002"	5 khz 2 kHz
Square Orthonol 50% Ni 50% Fe	1.42 – 1.58 T	500 °C	.0005" .001" .002" .004"	20 kHz 10 khz 5 kHz 1.5 kHz
Alloy 48 H 50% Ni 50% Fe	1.15 - 1.40 T	500 °C	.002" .004"	20 kHz 10 khz

Select the flux density that is suited to the material and the application. Saturating transformers will use the saturation flux density of the material. For standard converters flux density is limited to 50 – 80% of the saturation flux density. Lower the operating flux density if you need to limit the core losses. For example, from the Core Loss chart on page 11 one mil Permalloy operating at 0.1 Tesla, 1 kGauss, at 100 kHz will have losses of 20 watts per lb. Reducing the flux density or the frequency will lower the losses.

NOTE:

Core weight can be calculated (in pounds) using:

Weight = I_e x A_c x C, where
C = 0.0192 for Permalloy (80% Nickel) materials
0.0181 for Orthonol and 48 Alloy
0.0169 for Magnesil

4 Select the operating flux density (B) and solve the following equation for W_aA_c (area product):

$W_aA_c = (A_w V_p x10^8)/(4.0\ B_m\ K\ f)$

Use the values as noted above for A_w, V_p, B_m, and f in Hz.

4.0 for a square wave; 4.4 for sine wave excitation

W_a = winding area of core (cm^2)

A_c = effective core cross sectional area (cm^2)

K_W = winding factor. K is 0.20 for a common two winding transformer. If the transformer is a self-saturating Royer or Jensen type inverter use K = 0.15 to allow for the space required for the switching windings.

5 Select a core that has a W_aA_c value greater than the value that you calculated. W_aA_c values for Magnetics tape wound cores are listed in the Core Sizes Tables beginning on page 14.

From the Core Sizes, note the cross sectional area (A_c) of the selected core and the tape thickness. Use this value in the following equation to solve for the number of primary turns (Np).

$N_p = (V_p x10^8)/(4.0\ B_m\ f\ A_c)$ $N_s = (V_s/V_p) \times N_p$

Design Example:

- A core is needed for a 240 watt transformer.
- Primary input is 120 V at a current of 2A; Secondary is required to be 48 V out at 5 A. The frequency of operation is 10 kHz.
- 1 mil Orthonol is selected at an operating flux density of 7,250 Gauss.
- Wire chosen for the primary is AWG # 20; W_a is 0.00632 cm^2;
- Wire chosen for the secondary is AWG # 15; W_a is 0.0191 cm^2.
- $W_aA_c = (A_w V_p x10^8)/(4.0\ B_m\ K_w\ f)$ = (0.00632 x 120 V x 10^8)/(4.0 x 7,250 x 0.2 x 10,000) = 1.31
- The 01500261A core is chosen. W_aA_c of the 01500261A core, given in the chart, is 2.18 for 2 mil material, multiply the window area x the A_e for 1 mil material to arrive at a W_aA_c of 1.92 for 1 mil. material.
- OD nylon case = 40.6 mm ID = 22.9 mm HT = 12.2 mm
- $N_p = (V_p x10^8)/(4.0\ B_m\ f\ A_c)$ = (120 V x 10^8)/(4.0 x 7,250 x 10,000 x 0.454) = 91
- N_s = (48 V/ 120 V) x 91 = 36.4 = 37 turns. 91 x 0.00632 cm^2 = 0.575 cm^2, 37 x 0.0191 cm^2 = 0.7067 cm^2
- 0.575 cm^2 + 0.7067 cm^2 = 1.28 cm^2. Window area is 4.238 cm^2; Window fill = 30%.
- RMS current density 5A/ 0.0191 cm^2 = 262 A/cm^2 2A/0.00632 = 316 A/cm^2
- MLT estimated for a toroid = 0.8 (OD + 2 HT) = 0.8 (40.6 mm + 2 x(12.2 mm)) = 52 mm/turn
- Copper resistance MLT = 52 mm/turn
- Resistance in Ohms = 0.052 m x 91 turns x 0.03323 Ohms/m = 0.157 Ohms AWG #20
0.052 m x 37 turns x 0.01040 Ohms/m = 0.020 Ohms AWG #15
- [5^2 x (0.020 Ohms) = 0.500 Watts primary] + [2^2 x (0.166 Ohms) = 0.628 Watts secondary]
- Total DC copper losses = 1.1 Watts.
- Determine the Flux density to calculate core losses V = 4 N_p A_e f B x 10^{-8}
- 120 V = 4.0 (91) (0.454) (10,000) B (10^{-8}) ; B= (120 V) / (4.0 X 91 turns X 10,000 Hz x 10^{-8}) = 7261 Gauss
- B = 7261 Gauss, f = 10,000 Core loss curve for 1 mil A is about 60 W/lb the core weighs 0.0819 lb
- Core weight = I_e x A_e x C core wt. constant = 9.97 cm x 0.454 cm^2 x 0.0181= 0.0819 lb x 60 W/lb = 4.9 W

Efficiency estimate 240/246 Watts = 97.5%.

Magnetics Bobbin Cores are miniature tape cores made from ultra-thin (0.000125" to 0.001" thick) strip material wound on nonmagnetic stainless steel bobbins. Bobbin Cores are generally manufactured from Permalloy 80 and Orthonol. Covered with protective caps and then epoxy coated. Bobbin Cores can be made as small as 0.05" ID and with strip widths down to 0.032".

HOW TO ORDER

Each miniature core is coded by a part number, which describes it:

8 0 5 3 1 0 D M A

- 80 — Bobbin Core Code
- 531 — Core Size
- 0 — Gauge Code
- D — Material Code
- MA — Standard Part

OR **8 0 5 3 1 0 D 0 1 0 0 X X**

- 80 — Bobbin Core Code
- 531 — Core Size
- 0 — Gauge Code
- D — Material Code
- 0100 — Flux Capacity (Maxwell)*
- XX — Customer-defined Special Specification

*Flux capacity is the area under the open circuit output waveform, measured in Maxwells when the core is switched from positive residual to negative saturation.

Below is a quick reference for available combinations of materials, cases, and gauges.

Material Code	Materials	Available Cases/Coatings*	Gauges (Thickness)			
			0.000125" 1/8 mil (Gauge Code 9)	**0.00025" 1/4 mil** (Gauge Code 0)	**0.0005" 1/2 mil** (Gauge Code 5)	**0.001" 1 mil** (Gauge Code 1)
A	Square Orthonol	stainless steel with epoxy coating		X	X	X
D	Square Permalloy 80	stainless steel with epoxy coating	X	X	X	X
F	Supermalloy	stainless steel with epoxy coating			X	X

APPLICATIONS

Because of their temperature stability, low coercive values and high saturation flux densities, as well as high peak permeabilities and high squareness, Magnetics Bobbin Cores are ideal for:

> High Frequency Magnetic Amplifiers
> Flux Gate Magnetometers
> Harmonic Generators
> Oscillators
> Pulse Transformers
> Current Transformers
> Analog Counters and Timers
> Inverters

CORE PART NUMBER		CASE DIMENSIONS					SQUARE PERMALLOY 80 FLUX CAPACITY MAXWELLS				SQUARE ORTHONOL FLUX CAPACITY MAXWELLS		
		I.D. MIN	O.D. MAX	HT. MAX	MEAN LENGTH cm	WINDOW AREA cm^2	0.000125″	0.00025″	0.0005″	0.001″	0.00025″	0.0005″	0.001″
							Core area, A_e cm^2				*Core area, A_e cm^2*		
80521 * MA	in.	0.097	0.225	0.120	1.20	0.051	*0.002*	*0.0033*	*0.0053*	*0.0066*	*0.0033*	*0.0053*	*0.0066*
	mm.	2.46	5.72	3.05			30	50	80	100	100	160	200
80550 * MA	in.	0.128	0.255	0.120	1.45	0.086							
	mm.	3.25	6.48	3.05									
80505 * MA	in.	0.160	0.290	0.120	1.70	0.137							
	mm.	4.06	7.37	3.05									
80512 * MA	in.	0.222	0.350	0.120	2.20	0.255							
	mm.	5.64	8.89	3.05			*Core area, A_e cm^2*				*Core area, A_e cm^2*		
80529 * MA	in.	0.097	0.225	0.185	1.20	0.051	*0.004*	*0.0066*	*0.0105*	*0.0132*	*0.0066*	*0.0105*	*0.0132*
	mm.	2.46	5.72	4.70			60	100	160	200	200	320	400
80544 * MA	in.	0.125	0.255	0.185	1.45	0.086							
	mm.	3.18	6.48	4.70									
80523 * MA	in.	0.160	0.290	0.185	1.70	0.137							
	mm.	4.06	7.37	4.70									
80530 * MA	in.	0.222	0.350	0.185	2.20	0.255							
	mm.	5.64	8.89	4.70									
80524 * MA	in.	0.285	0.415	0.185	2.70	0.425							
	mm.	7.24	10.54	4.70									
80531 * MA	in.	0.345	0.480	0.185	3.20	0.620							
	mm.	8.76	12.19	4.70									
80608 * MA	in.	0.405	0.540	0.185	3.70	0.850							
	mm.	10.29	13.72	4.70									
80609 * MA	in.	0.47	0.605	0.185	4.20	1.140							
	mm.	11.94	15.49	4.70			*Core area, A_e cm^2*				*Core area, A_e cm^2*		
80558 * MA	in.	0.222	0.385	0.185	2.30	2.550	*0.006*	*0.010*	*0.016*	*0.0198*	*0.010*	*0.016*	*0.0198*
	mm.	5.64	9.78	4.70			90	150	240	300	300	480	600
80581 * MA	in.	0.285	0.445	0.185	2.80	0.425							
	mm.	7.24	11.30	4.70									
80610 * MA	in.	0.345	0.505	0.185	3.30	0.620							
	mm.	8.89	12.95	4.70									

*Gauge Code and Material Code are inserted here.

CORE PART NUMBER		CASE DIMENSIONS					SQUARE PERMALLOY 80 FLUX CAPACITY MAXWELLS				SQUARE ORTHONOL FLUX CAPACITY MAXWELLS		
		I.D. MIN	O.D. MAX	HT. MAX	MEAN LENGTH cm	WINDOW AREA cm^2	0.000125″	0.00025″	0.0005″	0.001″	0.00025″	0.0005″	0.001″
							Core area, A_e cm^2				Core area, A_e cm^2		
80611 * MA	in.	0.220	0.415	0.185	2.40	0.255	0.008	0.0133	0.021	0.0264	0.0133	0.021	0.0264
	mm.	5.59	10.54	4.70			120	200	320	400	400	640	800
80598 * MA	in.	0.285	0.480	0.185	2.90	0.425							
	mm.	7.24	12.19	4.70									
80516 * MA	in.	0.345	0.540	0.185	3.40	0.620							
	mm.	8.76	13.72	4.70									
80612 * MA	in.	0.405	0.605	0.185	3.90	0.850							
	mm.	10.29	15.37	4.70									
80588 * MA	in.	0.470	0.665	0.185	4.40	1.140							
	mm.	11.94	16.89	4.70			Core area, A_e cm^2				Core area, A_e cm^2		
80613 * MA	in.	0.285	0.510	0.185	3.00	0.425	0.010	0.0165	0.0265	0.033	0.0165	0.0265	0.033
	mm.	7.24	12.95	4.70			150	250	400	500	500	800	1,000
80606 * MA	in.	0.345	0.57	0.185	3.50	0.620							
	mm.	8.76	14.48	4.70									
80614 * MA	in.	0.405	0.63	0.185	4.00	0.850							
	mm.	10.29	16.00	4.70									
80615 * MA	in.	0.470	0.695	0.185	4.50	1.140							
	mm.	11.94	17.65	4.70			Core area, A_e cm^2				Core area, A_e cm^2		
80560 * MA	in.	0.217	0.385	0.320	2.30	0.245	0.012	0.020	0.032	0.0395	0.020	0.032	0.0395
	mm.	5.51	9.78	8.13			180	300	480	600	600	960	1,200
80539 * MA	in.	0.280	0.445	0.320	2.80	0.410							
	mm.	7.11	11.30	8.13									
80517 * MA	in.	0.342	0.510	0.320	3.30	0.602							
	mm.	8.69	12.95	8.13									
80616 * MA	in.	0.400	0.570	0.320	3.80	0.830							
	mm.	10.16	14.48	8.13									
80617 * MA	in.	0.465	0.630	0.320	4.30	1.120							
	mm.	11.81	16.00	8.13			Core area, A_e cm^2				Core area, A_e cm^2		
80600 * MA	in.	0.280	0.480	0.320	2.90	0.410	0.016	0.0265	0.042	0.053	0.0265	0.042	0.053
	mm.	7.11	12.19	8.13			240	400	640	800	800	1,280	1,600
80618 * MA	in.	0.342	0.540	0.320	3.40	0.602							
	mm.	8.69	13.72	8.13									
80619 * MA	in.	0.400	0.605	0.320	3.90	0.830							
	mm.	10.16	15.37	8.13									
80525 * MA	in.	0.465	0.665	0.320	4.40	1.120							
	mm.	11.81	16.89	8.13									

BOBBIN CORE DESIGN

Basic properties of a bobbin core are its size, material type and thickness, and its flux capacity. The size determines the maximum number of turns of wire that can be wound on the core and the dc winding resistance. The operating frequency and the losses that can be tolerated in the circuit determine the type of material selected and the tape thickness. The flux capacity, or volt second area, of the core determines its output per turn of wire and the voltage the core can support. Bobbin cores were designed for pulse applications. It is for this reason that the test conditions and measured characteristics supply information about Ts, switching time, Core One Flux, the amount of flux switched in one cycle, and squareness.

Flux capacities in Maxwells for each core are shown in the Bobbin Core Sizes Table. Nomograms related to core selection have been developed. For power applications a graph of Power handling vs Window Area Flux Product allows the designer to select a core based upon operating frequency and output power. Another graph illustrates switching time vs. H in Oersteds for switching applications. Core loss curves for the material will allow the designer to calculate core losses. Please contact Sales Engineering at Magnetics for additional bobbin core design information and to receive the families of curves.

Select the bobbin core best suited for your application:
Select the material type and thickness. Based on operation at or near saturation flux density, the following is a guide in selecting the proper thickness of materials for various frequency ranges:

Thickness (mils)	*Square Orthonol	*Square Permalloy 80
1	up to 8,000 Hz	up to 20,000 Hz
1/2	up to 20,000 Hz	up to 40,000 Hz
1/4	up to 40,000 Hz	up to 80,000 Hz
1/8		above 80,000 Hz

* If operating flux density is reduced, frequencies can be extended upwards from those listed. Square Permalloy has lower losses. Square Orthonol has greater flux capacity.

Square Permalloy 80 (Material Code D)				
Material Thickness (Mils)	$\varnothing_1$ % of Nominal	$\varnothing_0/\varnothing_1$ Max.	B_r / B_m (min)	T_s (micro-sec) Max.
1/8	±10%	0.050	90.5%	1.25
1/4	±10%	0.065	87.8%	1.60
1/2	±10%	0.090	83.5%	3.50
1	±15%	0.120	78.6%	8.00

Square Orthonol (Material Code A)				
Material Thickness (Mils)	$\varnothing_1$ % of Nominal	$\varnothing_0/\varnothing_1$ Max.	B_r / B_m (min)	T_s (micro-sec) Max.
1/4	±10%	0.050	90.5%	5.0
1/2	±10%	0.050	90.5%	8.0
1	±15%	0.050	90.5%	18.0

BOBBIN CORE TESTING

Integrated One Flux ($\varnothing_1$)

The integrated one flux is the value in Maxwells of the response produced when the one output voltage is passed through a calibrated integrator. It is the area under the one output voltage waveform, and is the flux switched when the core is driven from positive residual to negative saturation. Reference Figure #2.

Squareness (B_r/B_m)

The squareness is the ratio of the residual flux of a core to the saturation flux of a core.

Switching Time (T_s)

The switching time is that time interval between the point where the core output has risen to 10% of the core one output voltage and the point where the core output has decreased to 10% of the one output voltage. Reference Figure #3.

Noise to Signal Ratio ($\varnothing_0/\varnothing_1$)

The integrated zero flux, $\varnothing_0$, measured in Maxwells is the integral of the area under the Open circuit zero waveform when the flux is switched from negative residual to negative saturation. Divide this value by $\varnothing_1$ to obtain $\varnothing_0/\varnothing_1$.

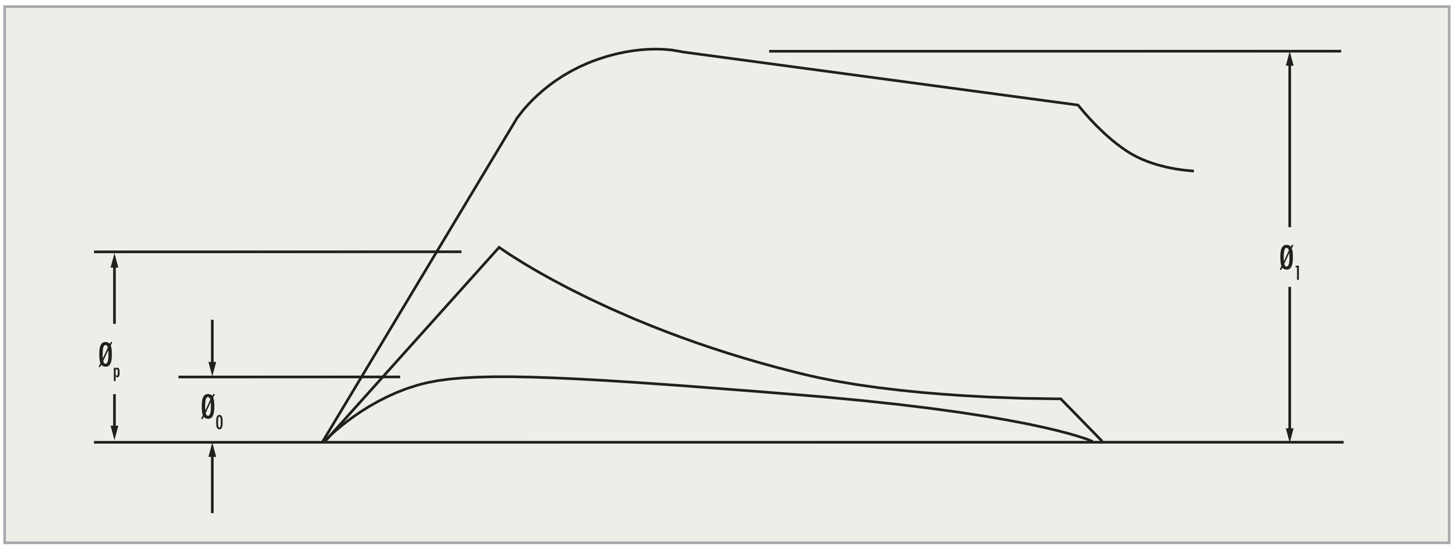


Fig 2: Integrated Core Response

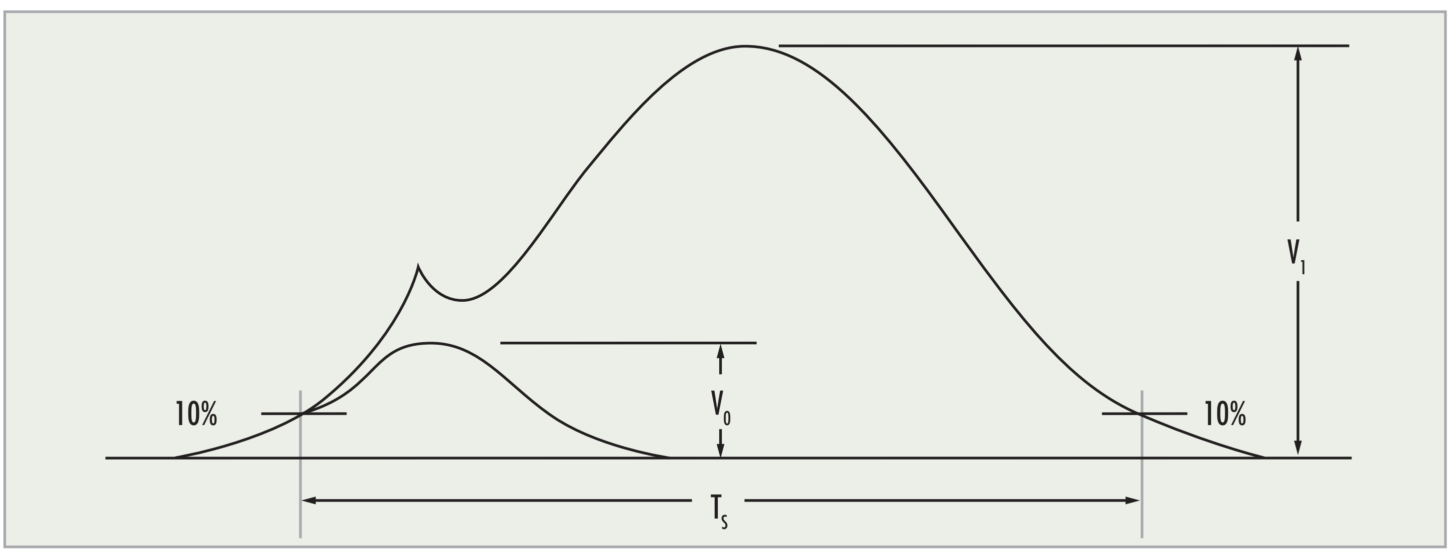


Fig 3: Open Circuit Outputs and Switching Time

WIRE TABLE

AWG Wire Size	Resistance W / meter (x.305, W/ft)	Wire OD(cm) Hvy Bld	Wire Area		Current Capacity, Amps (by columns of amps / sq.cm.)			
			Circ. Mils	sq. cm. (x0.001)	200	400	600	800
8	0.00207	0.334	18,000	91.2	16.5	33.0	49.5	66.0
9	0.00259	0.298	14,350	72.7	13.1	26.2	39.3	52.4
10	0.00328	0.267	11,500	58.2	10.4	20.8	31.2	41.6
11	0.00413	0.238	9,160	46.4	8.23	16.4	24.6	32.8
12	0.00522	0.213	7,310	37.0	6.53	13.1	19.6	26.1
13	0.00656	0.1902	5,850	29.6	5.18	10.4	15.5	20.8
14	0.00827	0.1714	4,680	23.7	4.11	8.22	12.3	16.4
15	0.01043	0.1529	3,760	19.1	3.26	6.52	9.78	13.0
16	0.01319	0.1369	3,000	15.2	2.58	5.16	7.74	10.3
17	0.01657	0.1224	2,420	12.2	2.05	4.10	6.15	8.20
18	0.0210	0.1095	1,940	9.83	1.62	3.25	4.88	6.50
19	0.0264	0.0980	1,560	7.91	1.29	2.58	3.87	5.16
20	0.0332	0.0879	1,250	6.34	1.02	2.05	3.08	4.10
21	0.0420	0.0785	1,000	5.07	0.812	1.63	2.44	3.25
22	0.0531	0.0701	810	4.11	0.640	1.28	1.92	2.56
23	0.0666	0.0632	650	3.29	0.511	1.02	1.53	2.04
24	0.0843	0.0566	525	2.66	0.404	0.808	1.21	1.62
25	0.1063	0.0505	425	2.15	0.320	0.61	0.962	1.28
26	0.1345	0.0452	340	1.72	0.253	0.506	0.759	1.01
27	0.1686	0.0409	270	1.37	0.202	0.403	0.604	0.806
28	0.0653	0.0366	220	1.11	0.159	0.318	0.477	0.636
29	0.266	0.0330	180	0.912	0.128	0.255	0.382	0.510
30	0.341	0.0295	144	0.730	0.100	0.200	0.300	0.400
31	0.430	0.0267	117	0.593	0.0792	0.158	0.237	0.316
32	0.531	0.0241	96.0	0.487	0.0640	0.128	0.192	0.256
33	0.676	0.0216	77.4	0.392	0.0504	0.101	0.152	0.202
34	0.856	0.01905	60.8	0.308	0.0397	0.0794	0.119	0.159
35	1.086	0.01702	49.0	0.248	0.0314	0.0627	0.0940	0.125
36	1.362	0.01524	39.7	0.201	0.0250	0.0500	0.0750	0.100
37	1.680	0.01397	32.5	0.165	0.0203	0.0405	0.0608	0.0810
38	2.13	0.01245	26.0	0.132	0.0160	0.0320	0.0480	0.0640
39	2.78	0.01092	20.2	0.102	0.0123	0.0245	0.0368	0.0490
40	3.51	0.00965	16.0	0.081	0.00961	0.0192	0.0288	0.0384
41	4.33	0.00864	13.0	0.066	0.00785	0.0157	0.0236	0.0314
42	5.45	0.00762	10.2	0.052	0.00625	0.0125	0.0188	0.0250
43	7.02	0.00686	8.40	0.043	0.00484	0.00968	0.0145	0.0194
44	8.50	0.00635	7.30	0.037	0.00400	0.00800	0.0120	0.0160
45	10.99	0.00546	5.30	0.027	0.00309	0.00618	0.00927	0.0124
46	13.81	0.00498	4.40	0.022	0.00248	0.00496	0.00744	0.00992
47	17.36	0.00452	3.60	0.018	0.00194	0.00388	0.00582	0.00776
48	22.1	0.00394	2.90	0.015	0.00175	0.00350	0.00525	0.00700
49	27.6	0.00353	2.25	0.011	0.00150	0.00300	0.00450	0.00600
50	34.7	0.00325	1.96	0.010	0.00098	0.00195	0.00292	0.00390

POWDER CORES

Powder cores are excellent as low loss inductors for switched-mode power supplies, switching regulators and noise filters. Most core types can be shipped immediately from stock.

Kool Mμ® powder cores have a higher energy storage capacity than MPP cores and are available in six permeabilities from 14μ through 125μ. Kool Mμ is available in a variety of core types, for maximum flexibility. Toroids offer compact size and self-shielding. E cores and U cores afford lower cost of winding, use of foil windings, and ease of fixturing. Very large cores and structures are available to support very high current applications. These include toroids and racetrack shapes up to 102 mm, 133 mm and 165 mm; jumbo E cores; stacked shapes; and blocks.

Molypermalloy Powder Cores (MPP) are available in ten permeabilities ranging from 14μ through 550μ, and have guaranteed inductance limits of ±8%. Insulation on the cores is a high dielectric strength finish not affected by normal potting compounds and waxes. Over thirty sizes include O.D.s from 3.56 mm to 165.1 mm. Standard cores include either temperature stabilized (as wide as -65° C to 125° C for stable operation) or standard stabilization.

High Flux powder cores have a much higher energy storage capacity than MPP cores and are available in six permeabilities from 14μ through 160μ. High Flux cores are available in sizes identical to MPP cores.

XFlux® distributed air gap cores are made from 6.5% silicon iron powder and are available in 26μ, 40μ and 60μ. A true high temperature material, with no thermal aging, XFlux offers lower losses than powder iron cores and superior DC Bias performance. The soft saturation of XFlux material offers an advantage over ferrite cores. XFlux cores are ideal for low and medium frequency chokes where inductance at peak current is critical. Toroids are available in sizes up to 133 mm and blocks with lengths of 50, 60, and 80 mm.

AmoFlux® is a new powder alloy distributed gap material that is ideal for power factor correction (PFC) and output chokes. This alloy starts with low core loss ribbon that is pulverized into powder and then pressed into a toroid. By converting the ribbon into a powder, the resulting AmoFlux cores have the same excellent properties, including soft saturation, as Magnetics other powder core materials: Kool Mμ®, MPP, High Flux, and XFlux®. What makes this amorphous powder core material unique is the combination of low core loss and high DC bias. These attributes make AmoFlux an excellent choice for computer, server, and industrial power supplies that require PFC or output chokes.

FERRITE CORES

Ferrite Cores are manufactured for a wide variety of applications. Magnetics has developed and produces the leading MnZn ferrite materials for power transformers, power inductors, wideband transformers, common mode chokes, and many other applications. In addition to offering the leading materials, other advantages of ferrites from Magnetics include: the full range of standard planar E and I Cores; rapid prototyping capability for new development; the widest range of toroid sizes in power and high permeability materials; standard gapping to precise inductance or mechanical dimension; wide range of coil former and assembly hardware available; and superior toroid coatings available in several options.

POWER MATERIALS

Five low loss materials, R, P, F, L and T, are engineered for optimum frequency and temperature performance in power applications. Magnetics' materials provide superior saturation, high temperature performance, low losses, and product consistency.

Shapes: E cores, Planar E cores, ETD, EC, U cores, I cores, PQ, Planar PQ, RM, Toroids, Pot cores, RS (roundslab), DS (double slab), EP, Special shapes

Applications: Telecomm, Computer, Commercial and Consumer Power Supplies, Automotive, DC-DC Converters, Telecomm Data Interfaces, Impedance Matching Transformers, Handheld Devices, High Power Control (gate drive), Computer Servers, Distributed Power (DC-DC), EMI Filters, Aerospace, Medical.

HIGH PERMEABILITY MATERIALS

Two high permeability materials (J, 5,000μ, and W, 10,000μ) are engineered for optimum frequency and impedance performance in signal, choke and filter applications. Magnetics' materials provide superior loss factor, frequency response, temperature performance, and product consistency.

Shapes: Toroids, E cores, U cores, RM, Pot cores, RS (round-slab), DS (double slab), EP, Special shapes

Applications: Common Mode Chokes, EMI Filters, Other Filters, Current Sensors, Telecomm Data Interfaces, Impedance Matching Interfaces, Handheld Devices, Spike Suppression, Gate Drive Transformers, Pulse Transformers, Current Transformers, Broadband Transformers

CUSTOM COMPONENTS

Magnetics offers unique capabilities in the design and manufacture of specialized components fabricated from magnetic materials in many sizes and shapes.

Ferrites can be pressed in block form and then machined into intricate shapes. Where large sizes are required, it is possible to assemble them from two or more smaller machined or pressed sections. The variety of sizes and shapes is limitless.

Surface Grinding	Hole Drilling
Cutting, Slicing, Slotting	Special Machining
ID and OD Machining	Assembly of Smaller Parts

Without sacrificing magnetic properties, many operations can be performed on ferrites, while maintaining strict dimensional or mechanical tolerances:

Standard catalog items can also be modified, as needed, to fit your requirements.

Contact the Magnetics Sales Department for more information.

RAPID PROTOTYPING SERVICE

Magnetics' world-class materials offer unique and powerful advantages to almost any application. An even greater competitive edge can be gained through innovations in new core shapes and custom geometries, and Magnetics is poised to help. Our Rapid Prototyping Service can quickly make a wide variety of core shapes in Ferrite, MPP, High Flux, Kool Mµ®, AmoFlux®, or XFLUX®. Our rapid turnaround time results in a shorter design period, which gets your product to market faster. Plus, our Sales Engineers may be able to provide design assistance that could lead to a lower piece price. To learn more about how our Rapid Prototyping Service can help you shorten your design cycle, contact a Magnetics Sales Engineer.

WARRANTY

All standard parts are guaranteed to be free from defects in material and workmanship, and are warranted to meet the Magnetics published specification. No other warranty, expressed or implied, is made by Magnetics. All special parts manufactured to a customer's specification are guaranteed only to the extent agreed upon, in writing, between Magnetics and the user.

Magnetics will repair or replace units under the following conditions:

1. The buyer must notify Magnetics, Pittsburgh, PA 15238 in writing, within 30 days of the receipt of material, that he requests authorization to return the parts. A description of the complaint must be included.

2. Transportation charges must be prepaid.

3. Magnetics determines to its satisfaction that the parts are defective, and the defect is not due to misuse, accident or improper application.

Magnetics liability shall in no event exceed the cost of repair or replacement of its parts, if, within 90 days from date of shipment, they have been proven to be defective in workmanship or material at the time of shipment. No allowance will be made for repairs or replacements made by others without written authorization from Magnetics.

Under no conditions shall Magnetics have any liability whatever for the loss of anticipated profits, interruption of operations, or for special, incidental or consequential damages.

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