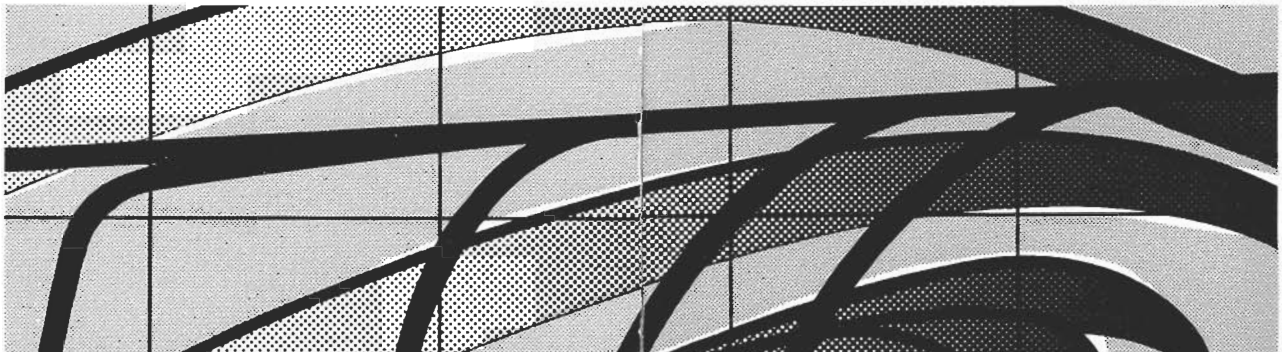
TAPE WOUND CORE DESIGN CHART



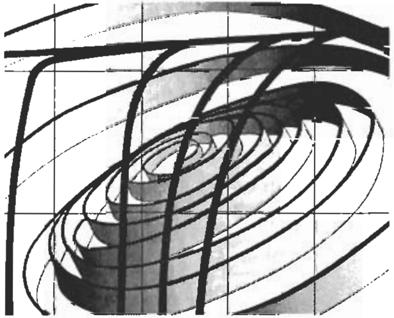
Magnetic Metals Company • Hayes Avenue at 21st Street • Camden, N.J. 08101.

east is east

And there is no real reason to order your Tape Wound Cores from the other coast. Magnetic Metals has full Tape Wound Core production facilities (not just warehouses) on both coasts. So, no matter where you need them, Magnetic Metals makes Tape Cores — and stocks them — near to you. This means the fastest delivery possible.

Stock quantities maintained on:

- Tape Wound Cores
- Permalloy Powder Cores
- Ferrite Pot Cores
- Ferrite Toroids
- Electromagnetic shielding
- Transformer laminations
- Synchro-servo laminations



MAGNETIC METALS

HAYES AVENUE AT 21ST STREET
CAMDEN, NEW JERSEY 08101
(609) 964-7842
Camden, N. J., Chicago, Ill.
Newport Beach, Calif.

Call Magnetic Metals now for the Tape Wound Cores and other magnetic parts you need.

west is west

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TAPE WOUND CORE DESIGN CHART

CORE AND CASE SIZES AND CHARACTERISTICS

Core* No.	Gross[1] Core Area CM²	Mean Path Length CM	CORE SIZE I.D. Inches	CORE SIZE O.D. Inches	CORE SIZE Height Inches	Gross[2] Core Weight In Lbs. Multiply By 10⁻²	CASE SIZE PLASTIC I.D. Inches	PLASTIC O.D. Inches	PLASTIC Height Inches	PLASTIC Wire Length[3] Per Turn Min.	PLASTIC Wire Length[3] Inches Max.	CASE SIZE METAL I.D. Inches	METAL O.D. Inches	METAL Height Inches	METAL Wire Length[3] Per Turn Min.	METAL Wire Length[3] Inches Max.	Turns/Volt[4] At 10,000 Gausses 60Hz	Turns/Volt[4] At 10,000 Gausses 400Hz	µh per[5] Turn For 10,000 Perm-ability	NI[6] Per Oersted In Ampere Turns	WA[7] CA Product (Inches)⁴
47	.0504	4.49	.500	.625	.125	.411	.440	.685	.195	.640	1.31	.437	.688	.197	.650	1.33	746	112	1.41	.357	.0012
2	.101	4.99	.500	.750	.125	.914	.440	.820	.195	.775	1.69	.435	.825	.197	.790	1.71	371	56	2.54	.397	.0023
5	.101	6.18	.650	.900	.125	1.134	.585	.975	.195	.785	1.71	.585	.975	.197	.790	1.73	371	56	2.06	.491	.0042
9	.101	8.98	1.000	1.250	.125	1.646	.915	1.340	.195	.820	2.44	.915	1.340	.197	.825	2.45	371	56	1.41	.715	.0103
79	.201	6.98	.750	1.000	.250	2.56	.665	1.085	.340	1.105	2.22	.665	1.085	.327	1.080	2.21	185	28	3.62	.556	.0108
30	.201	8.98	1.000	1.250	.250	3.29	.915	1.340	.330	1.070	2.70	.915	1.340	.327	1.085	2.72	185	28	2.81	.715	.0205
37	.227	6.48	.625	1.000	.188	2.68	.570	1.085	.272	1.065	1.88	.570	1.085	.265	1.050	1.89	165	25	4.41	.515	.0090
7	.227	7.48	.750	1.125	.188	3.09	.665	1.215	.262	1.070	2.54	.665	1.215	.265	1.075	2.55	165	25	3.81	.593	.0122
3	.302	6.48	.625	1.000	.250	3.57	.570	1.085	.340	1.200	2.04	.570	1.085	.327	1.175	2.03	124	18.6	5.87	.515	.0120
10	.302	9.48	1.000	1.375	.250	5.21	.925	1.455	.320	1.175	2.93	.925	1.455	.327	1.190	2.95	124	18.6	4.01	.755	.0315
16	.302	14.46	1.625	2.000	.250	7.95	1.525	2.110	.330	1.255	4.21	1.525	2.110	.327	1.250	4.21	124	18.6	2.63	1.152	.0856
39	.403	9.97	1.000	1.500	.250	7.31	.925	1.570	.330	1.310	2.86	.925	1.570	.327	1.305	2.86	93	14.0	5.08	.793	.0420
13	.403	11.97	1.250	1.750	.250	8.78	1.170	1.822	.340	1.240	3.60	1.170	1.820	.327	1.215	3.60	93	14.0	4.24	.952	.0672
11	.604	9.97	1.000	1.500	.375	10.97	.925	1.570	.455	1.570	3.09	.925	1.570	.452	1.555	3.11	62	9.3	7.62	.793	.0630
96	.604	14.46	1.625	2.000	.500	15.91	1.525	2.100	.590	1.775	4.73	1.525	2.100	.607	1.810	4.72	62	9.3	5.24	1.152	.1712
62	.807	9.97	1.000	1.500	.500	14.63	.915	1.595	.621	1.927	3.17	.925	1.570	.607	1.865	3.17	46	6.9	11.80	.793	.0840
29	.807	11.97	1.250	1.750	.500	17.55	1.170	1.822	.620	1.900	4.16	1.170	1.820	.607	1.875	4.16	46	6.9	8.46	.952	.1344
14	.807	13.96	1.500	2.000	.500	20.5	1.400	2.110	.620	1.960	4.41	1.400	2.110	.607	1.940	4.41	46	6.9	7.23	1.107	.1924
17	.807	17.95	2.000	2.500	.500	26.3	1.860	2.652	.610	2.025	5.36	1.860	2.652	.607	2.025	5.36	46	6.9	5.63	1.428	.340
18	.807	21.94	2.500	3.000	.500	32.2	2.360	3.152	.620	2.145	6.47	2.360	3.152	.607	2.125	6.47	46	6.9	4.61	1.742	.547
75	.908	12.97	1.250	2.000	.375	21.4	1.170	2.110	.445	1.840	3.91	1.170	2.110	.452	1.855	3.93	41.3	6.2	14.78	.952	.1512
60	1.210	12.97	1.250	2.000	.500	28.5	1.170	2.110	.620	2.190	4.23	1.170	2.110	.607	2.170	4.23	31	4.6	11.52	1.032	.202
15	1.613	15.96	1.500	2.500	.500	46.8	1.400	2.600	.610	2.430	4.69	1.400	2.600	.607	2.425	4.71	23	3.5	12.72	1.269	.385
76	1.613	19.95	2.000	3.000	.500	58.5	1.890	3.120	.621	2.485	5.73	1.910	3.100	.607	2.440	5.71	23	3.5	10.16	1.586	.716
19	1.613	23.94	2.500	3.500	.500	70.2	2.313	3.688	.698	2.670	6.74	2.313	3.688	.607	2.605	6.71	23	3.5	8.46	1.909	1.050
168	2.420	14.96	1.500	2.250	1.000	65.8	1.400	2.360	1.110	3.190	5.77	1.420	2.340	1.135	3.200	5.79	15.5	2.3	20.25	1.188	.594
58	3.226	19.95	2.000	3.000	1.000	117.0	1.860	3.152	1.198	3.705	6.80	1.860	3.152	1.135	3.580	6.80	11.6	1.74	20.35	1.586	1.359
20	3.226	23.94	2.500	3.500	1.000	140.4	2.313	3.688	1.188	3.765	7.74	2.313	3.688	1.135	3.665	7.69	11.6	1.74	16.96	1.909	2.101
21	5.040	24.94	2.500	3.750	1.250	228.6	2.313	3.938	1.448	4.535	8.38	2.313	3.938	1.385	4.410	8.33	7.5	1.12	25.51	1.983	3.283
22	6.050	24.94	2.500	3.750	1.500	274.3	2.313	3.938	1.688	5.015	8.88	2.313	3.938	1.685	5.015	8.83	6.2	0.93	30.60	1.993	3.939
23	6.050	30.92	3.250	4.500	1.500	340.1	3.062	4.688	1.688	5.020	10.54	3.062	4.688	1.685	5.020	10.55	6.2	0.93	24.55	2.465	6.904
25	8.064	36.91	4.000	5.250	2.000	541.2	3.813	5.438	2.188	6.020	13.61	3.813	5.438	2.195	6.040	13.63	4.65	0.70	27.35	2.935	14.27
77	8.468	32.92	3.250	5.000	1.500	506.9	3.062	5.188	1.688	5.525	10.83	3.062	5.188	1.685	5.530	10.84	4.43	0.67	32.35	2.620	9.665
78	12.90	39.90	4.000	6.000	2.000	936.2	3.813	6.188	2.188	6.775	13.95	3.813	6.188	2.195	6.795	14.05	2.92	0.44	40.55	3.175	22.84

NOTE 1.

For net core area of each of the following strip thicknesses use the indicated stacking factor.

.0005" - .50	.006" - .90
.001" - .75	.012" - .95
.002" - .85	.014" - .95
.004" - .90	

NOTE 2:

To obtain net weight, multiply by the stacking factor of Note 1 and the following material factors:

Super Square 80	1.059
Square 80	1.059
Supermalloy	1.059
Superperm 80	1.059
Square 49	1.000
Superperm 49	1.000
Supermendur	0.988
Microsil	0.927

NOTE 3.

Wire length per turn in inches.

Min. —First layer, nominal length of wire per turn.

Max. - Outside layer, approximate length for fully wound core based on the minimum ID increasing for larger size cores.

NOTE 4.

Turns/volt for 10-kilogauss B_m for gross core area. Divide by factors of Note 1 to obtain turns per volt for actual core area for each metal thickness. Can be used for any core having indicated cross sectional area.

NOTE 5.

Microhenries/turn for 10,000 permeability for gross core area. Multiply by factors of Note 1 to obtain inductance for actual area for each metal thickness.

NOTE 6.

Use this to find ampere-turns to saturate core. Multiply by oersteds required for saturation from core material curves. Can be used for any core having these path lengths.

NOTE 7.

Product of window area x core area in (inches)⁴.

*These are IEEE Publication No. 104 recommended core sizes plus a few others. For more complete listing of available sizes, see core catalog. For other sizes, contact your Magnetic Metals sales representative.

1. To determine the number of turns required by a transformer winding operating at a specific voltage and frequency:

   a. Use: $N = \dfrac{E \times 10^8}{4.44 f A_c B_m}$

   Where:

   N = turns required for winding

   E = voltage applied to winding in volts rms

   f = frequency of applied voltage, E, in hertz

   A_c = net cross-sectional area of core in cm^2

   B_m = maximum flux density for material selected in gausses

   OR

   b. Use turns/volt for 10 kilogausses in table 1. Make certain to adjust turns/volt for actual flux level and applicable stocking factor.

2. To determine the inductance of a winding on a core:

   a. Use: $L = \dfrac{.4\pi\mu N^2 A}{10^8 l}$

   Where:

   L = inductance (henries) of winding

   N = number of turns on winding

   A = net core area in cm^2

   l = core length in cm

   OR

   b. Use table 1 for inductance in microhenries per turn for 10,000 permeability and adjust for net core area and appropriate core permeability. Inductance is proportional to square of turns.

3. To determine degree of saturation for current through a winding:

   a. Calculate $H = \dfrac{.4\pi NI}{l}$

   Where:

   H = magnetizing force in oersteds

   N = turns on winding

   I = RMS current

   l = core length in cm

   THEN determine flux level (B_m) from B–H loop or magnetization curve.

   OR

   b. From desired flux level (B_m), determine magnetizing force (H) in oersteds from B–H loop or other material performance curves. Then use "NI/Oersteds" from table 1 to determine the ampere-turns required to attain desired flux level.

WIRE TABLE

Wire Size AWG	Wire Diameter With Heavy Insulation (Inches)	Area Circular Mils Nominal	Resistance In Ohms Per 1000 Ft.	Weight In Pounds Per 1000 Ft.	Layer Winding In Turns Per Inch	Random Winding In Turns Per Inch²	Machine Winding Minimum Wound I.D. (Inches)	Maximum Turns For Case I.D. of 0.5 In.	1.0 In.
8	.132	16510	.628	50.4	6	42	2.000	—	—
9	.118	13090	.793	40.0	7	57	1.750	—	—
10	.106	10380	.999	31.7	8	75	1.500	—	—
11	.094	8230	1.26	25.2	9	95	1.250	—	—
12	.084	6530	1.59	20.1	11	130	1.000	—	—
13	.075	5190	2.00	15.9	12	159	.875	—	—
14	.067	4110	2.52	12.6	13	193	.875	—	—
15	.060	3260	3.18	10.0	15	248	.875	—	—
16	.054	2580	4.02	7.95	17	316	.750	—	120
17	.048	2050	5.05	6.32	19	394	.750	—	180
18	.043	1620	6.39	5.02	21	487	.750	—	260
19	.039	1290	8.05	3.99	23	596	.500	60	360
20	.035	1020	10.13	3.16	26	792	.500	80	450
21	.031	812	12.77	2.51	29	982	.500	90	560
22	.028	640	16.20	1.99	32	1210	.438	120	680
23	.025	510	20.30	1.59	36	1260	.438	150	850
24	.022	404	25.67	1.26	40	1550	.313	180	1040
25	.020	320	32.37	1.01	45	1940	.313	250	1310
26	.018	253	41.02	.799	50	2700	.300	310	1560
27	.016	202	51.44	.634	55	3550	.300	370	1870
28	.014	159	65.31	.504	62	4180	.300	470	2500
29	.013	128	81.21	.401	68	5160	.300	620	3250
30	.012	100.0	103.7	.318	77	6560	.250	750	4000
31	.011	79.2	130.9	.254	85	8090	.250	920	5050
32	.010	64.0	162.0	.202	94	10000	.250	1250	6870
33	.009	50.4	205.7	.161	105	12500	.250	1510	8740
34	.008	39.7	261.3	.127	119	16250	.218	1920	10620
35	.007	31.4	330.7	.101	133	20600	.218	2440	13120
36	.0060	25.0	414.8	.0803	145	25000	.218	2930	16250
37	.0055	20.2	512.1	.0641	161	30900	.218	3500	19370
38	.0049	16.0	648.2	.0509	181	39300	.218	4300	23750
39	.0043	12.2	846.6	.0403	205	51500	.218	5300	30000
40	.0038	9.61	1079	.0319	226	72000	.218	7450	42500
41	.0034	7.84	1323	.0252	250	89800	.218	9950	58120
42	.0030	6.25	1659	.0199	283	116500	.218	12600	72500
43	.0027	4.84	2143	.0159	315	143000	.187	14900	85000
44	.0025	4.00	2593	.0127	340	168500	.187	17400	100000