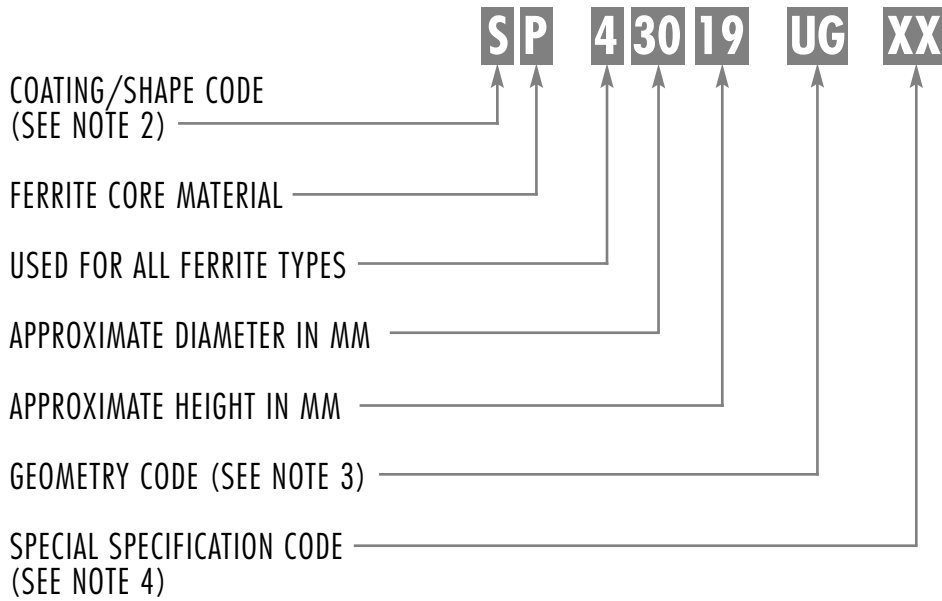


## Ungapped Cores and Toroids

### 1. TYPICAL PART NUMBER



### 2. COATING/SHAPE CODE

For some cores, a designation letter precedes the material code.

COATING/SHAPE CODE		
CODE	MEANING	EXAMPLE
C	Planar E-core with clip recesses	CR45810EC
D	DS core with solid centerpost	DF42311UG
F	Planar E-core option: no clip recesses	FR45810EC
H	DS core with a center hole	HP41408UG
N	RM core with solid centerpost	NP41510UG
P	EP core	PJ41313UG
R	RM core with a center hole	RG41510UG
S	RS core	SD41408UG
V	Nylon toroid coating	VJ42206TC
X	Black coating (contact factory)	XW41003TC
Y	Parylene toroid coating	YA40603TC
Z	Epoxy toroid coating	ZJ42915TC
0	No meaning (e.g.OP-41808-EC is the same as P-41808-EC)	

## Ungapped Cores and Toroids

### 3. GEOMETRY CODE

For standard ungapped cores, a two letter code indicates the geometry.

#### GEOMETRY CODE

CODE	GEOMETRY	EXAMPLE	UNIT OF MEASURE
EC	All E-cores, including ETD, EC, EER, EEM, EFD, planar and lamination size.	OP44317 <u>EC</u>	Piece
IC	I-Core	OJ42516 <u>IC</u>	Piece
TC	Toroid	ZJ42915 <u>TC</u>	Piece
UC	U-Core	OJ41106 <u>UC</u>	Piece
UG	POT, RS, DS, RM, PQ, EP	DF42311 <u>UG</u>	Set

### 4. SPECIAL SPECIFICATION CODE

A variety of features over and above the standard specifications are available. For details, see the section on page 1.7, "Special Specification Codes."

### 5. UNIT OF MEASURE

POT, RS, DS, RM, PQ, and EP cores are ordered in sets. One set is a pair of two pieces. One set usually is ordered for each transformer, inductor, or device to be built.

E-, U-, and I-Cores are ordered in individual pieces. Two pieces usually are ordered for each transformer, inductor, or device to be built.

Toroids are ordered in individual pieces.

### HARDWARE

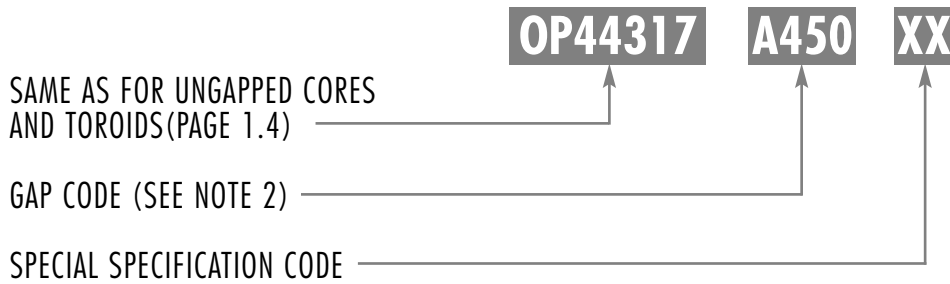
Accessory hardware is offered for nearly all of the cores shown in this catalog. Available items are shown together with the appropriate cores.

***Magnetics is a UL-recognized molder in the QMMY2 fabricated parts program. Many bobbins shown in this catalog are covered. Contact the factory for details on specific parts.***

The part number and material are shown with the drawing for each bobbin. Every bobbin is provided in the material defined by the part number, whether the bobbin is covered in the UL QMMY2 program or not.

## Gapped Cores

### 1. TYPICAL PART NUMBER



### 2. GAP CODE

The letter indicates the type of gap and a three-digit number defines the value.

#### GAP CODE

CODE	MEANING	EXAMPLE
A_ _ _	$A_L$ (if < 1000)	DF42311A275 ( $A_L = 275$ )
X_ _ _	$A_L$ if 1000 or greater (add 1000 to code)	OP44721X250 ( $A_L = 1250$ )
F_ _ _	$A_L$ if < 100, non-integer (divide code by 10)	OR42510F807 ( $A_L = 80.7$ )
G_ _ _	Depth of grind in mils (1000 <sup>ths</sup> of an inch)	OF44317G079 (Gap = 0.079")
M_ _ _	Depth of grind, mm (divide code by 10)	OF43019M015 (Gap = 1.5mm)

$A_L$  is inductance factor, mH/1000 Turns, or nH/T<sup>2</sup> (see page 14.2 for definitions, page 2.1 for measurement setup.) See the chart on pages 1.8-1.11 for tolerances. The standard gap codes do not apply to U-Cores, toroids, I-Cores, or some E-I combinations.

### 3. UNIT OF MEASURE

See Note 5 on page 1.5. For parts ordered in pieces (E-Cores), the depth of grind is given for each piece. For parts ordered in sets, the depth of grind is given as a total for the set, and may be UG/G or G/G (see the chart on page 1.8 to determine which is standard.)

When ordering E-cores gapped to an  $A_L$  value it is critical to understand whether the standard is UG/G or G/G. See Note 1 on page 1.9.

### 4. SPECIAL REQUIREMENTS

Many non-standard features are available, including gap values and tolerances that are different from those shown on the tables in this catalog. The next section on this page, "Special Specification Codes" explains how part numbers are defined for non-standard requirements.

For assistance with any special requirements, Magnetics customer service representatives and applications engineers are available to help you.

## Special Specification Codes

### SPECIAL SPECIFICATION CODES

For special customer requirements, a detailed product specification is written. This special specification is referenced to a unique two-character part number suffix. The resulting part number is reserved for the exclusive use of the originating customer and any sub-contractors that the originating customer designates.

Special specifications can be written to meet a wide variety of requirements, including:

- CUSTOM PACKAGING
- CUSTOM MARKING
- NON-STANDARD TOLERANCES
- NON-STANDARD UNITS OF MEASURE
- CUSTOM ELECTRICAL PERFORMANCE
- MODIFIED HEIGHTS
- SPECIAL TESTING
- MANY OTHER NEEDS

For five common requirements, a standard letter code is used in the suffix location:

### SPECIAL SPECIFICATION CODE

CODE	MEANING	EXAMPLE
NS	Not stamped; the standard part marking is omitted.	DF42311UGNS
CC	Color coded; see page 13.3 for the color index.	ZP42915TCCC
EI	E-core gapped to an $A_L$ value when mated with the standard I-core.	CR42216A160EI $A_L = 160 \pm 3\%$ with CR42216IC

## Depth of Grind Tolerance Ranges

Either the  $A_L$  or the depth of grind (not both) is controlled during production of gapped cores. Part numbering for gapped cores is explained on page 1.6. Codes A, X and F define  $A_L$  values. Codes G and M define depths of grind.

In most applications, defining the gap with the  $A_L$  results in inductors with the least variation. Electrical measurement is inherently more precise, and compensation is made for variability in material permeability and core geometry. For deep gaps, however, better consistency often results when the depth of grind is specified. In such cases, variation in the finished inductor is dominated by the variation in the windings, especially if the number of turns is low.

“Ungapped to gap combination” means an asymmetrical gap; the entire gap is taken from one piece, and the other piece is ungapped. “Gap to gap combination” means the gap is symmetrical; half of the total gap is ground into each piece.

INCHES		For shapes: POT, RS, DS, RM, PQ, and EP Cores.	MILLIMETERS	
GAP	TOLERANCE		GAP	TOLERANCE
0.001"–0.038"	±0.0005"	Ungapped to gap combination.	0.1mm–0.9mm	±0.03mm
0.039"–0.076"	±0.001"	Ungapped to gap combination <i>(Except if the gap is more than 10% of the minimum bobbin depth for the set*. Then gap-to-gap combination.)</i>	1.0mm–1.9mm	±0.04mm
0.077"–0.114"	±0.002"	Gap to gap combination <i>(Except if the gap is less than 10% of the minimum bobbin depth for the set*. Then ungapped-to-gap combination.)</i>	2.0mm–2.9mm	±0.07mm
0.115"–0.152"	±0.002"	Gap to gap combination.	3.0mm–3.8mm	±0.07mm
0.153"–0.228"	±0.004"	Gap to gap combination.	3.9mm–5.0mm	±0.12mm

\*The bobbin depth for the set is the 2D dimension, or 2 times the D dimension.

INCHES		For E-Cores: Lamination Size, EFD, EEM, EC, ETD, ER, EER, Planar E, and other E-Cores.  <i>E-cores are sold as pieces, not sets. To make an ungapped/gapped set, use one piece of each. For example, use OR41808G050 with OR41808EC for an asymmetrical gap of 0.050" ± 001". For the same gap, but symmetric, use two pieces of OR41808G025.</i>	MILLIMETERS	
GAP	TOLERANCE		GAP	TOLERANCE
0.001"–0.038"	±0.0005"	0.1mm–0.9mm	±0.03mm	
0.039"–0.076"	±0.001"	1.0mm–1.9mm	±0.04mm	
0.077"–0.152"	±0.002"	2.0mm–3.8mm	±0.07mm	
0.153"–0.228"	±0.004"	3.9mm–5.0mm	±0.12mm	

For more information about gapped cores and using them, please see pages 4.13-4.19. For tolerance requirements other than those shown below, please contact the factory.

## Gapping for $A_L$

### 1. UNIT OF MEASURE

When specifying and ordering E-Cores gapped to an  $A_L$ , it is important to note which cores are produced in gap-to-gap combination, because two gapped pieces are assembled to achieve the  $A_L$ . Alternatively, for E-Cores provided ungapped-to-gap, an ungapped piece must be used with the gapped part to achieve the  $A_L$ . POT, RS, DS, RM, PQ, and EP cores are sold as sets whether the combination is G/G or UG/G.

### 2. SIGNIFICANT FIGURES

$A_L$  testing and limits are calculated to three significant digits, based on the nominal value. For example,  $A_L = 99 \pm 3\%$  is interpreted as 96.0 Minimum, 99.0 Nominal, and 102.0 Maximum.

### 3. CORRELATION

Magnetics tests gapped  $A_L$  values with full bobbins, usually 100 turns, or 250 turns for deep gaps. The drive level is low (5 Gauss) and the frequency is set low enough to avoid resonance effects. Measured inductance in an application may vary significantly from the theoretical value due to low turns, low bobbin fill, leakage effects, resonance effects, or elevated drive levels.

*It is important for the user to verify the correlation between the test of the core and the specific test being applied to the inductor or transformer. Planar E Cores and planar PQ cores are especially susceptible to correlation discrepancies.*

### PC (POT) CORES FOUND IN SECTION 6

	GAP TO GAP $\pm 3\%$	UNGAPPED TO GAP COMBINATION			
		$\pm 3\%$	$\pm 5\%$	$\pm 7\%$	$\pm 10\%$
40704	25-35	36-62	63-95	96-125	126-175
40905	25-48	49-87	88-135	136-180	181-240
41107	25-75	76-135	136-220	221-285	286-399
41408	71-113	114-210	211-307	308-417	418-574
41811	96-174	175-326	$\leq 523$	$\leq 712$	$\leq 988$
42213	113-204	205-482	$\leq 779$	$\leq 1060$	$\leq 1459$
42616	139-249	250-695	$\leq 1125$	$\leq 1543$	$\leq 1999$
43019	170-304	305-1015	$\leq 1642$	$\leq 1999$	
43622	222-399	400-1494	$\leq 1999$		
44229	169-389	390-1965	$\leq 1999$		
44529	172-549	550-1999			

### RS (ROUND-SLAB) CORES FOUND IN SECTION 7

	GAP TO GAP $\pm 3\%$	UNGAPPED TO GAP COMBINATION			
		$\pm 3\%$	$\pm 5\%$	$\pm 7\%$	$\pm 10\%$
41408		25-177	$\leq 283$	$\leq 385$	$\leq 530$
42311	25-39	40-347	$\leq 708$	$\leq 963$	$\leq 1325$
42318	25-39	40-452	$\leq 731$	$\leq 994$	$\leq 1378$
42616	25-39	40-622	$\leq 998$	$\leq 1369$	$\leq 1884$
43019	25-62	63-918	$\leq 1485$	$\leq 1999$	

Charts show type of combination and the guaranteed tolerance for corresponding  $A_L$  ranges. For special tolerances, or for  $A_L = 2000$  or higher, contact the factory.

Ranges indicated are the tolerances for standard gapped cores.

For  $\pm 5\%$ ,  $\pm 7\%$ , and  $\pm 10\%$ , the maximum  $A_L$  for each tolerance is shown. Standard cores are manufactured to the smallest allowed tolerance.

# Gapped Cores

## Gapping for $A_L$

### DS (DOUBLE-SLAB) CORES FOUND IN SECTION 7

	UNGAPPED TO GAP COMBINATION				
	GAP TO GAP ±3%	±3%	±5%	±7%	±10%
42311	109-195	196-386	≤ 625	≤ 850	≤ 1170
42318	78-135	136-441	≤ 706	≤ 961	≤ 1332
42616	117-205	206-580	≤ 930	≤ 1276	≤ 1756
43019	149-264	265-873	≤ 1412	≤ 1922	≤ 1999

### RM CORES FOUND IN SECTION 8

	UNGAPPED TO GAP COMBINATION				
	GAP TO GAP ±3%	±3%	±5%	±7%	±10%
41110	25-50	51-55	≤ 75	≤ 170	≤ 250
41510	56-99	100-162	≤ 258	≤ 352	≤ 484
41812	69-120	121-238	≤ 381	≤ 519	≤ 714
41912	69-120	121-238	≤ 381	≤ 519	≤ 714
42316	84-150	151-395	≤ 633	≤ 862	≤ 1195
42819	126-200	201-625	≤ 1002	≤ 1374	≤ 1892
43723	145-250	251-977	≤ 1580	≤ 1999	

### EP CORES FOUND IN SECTION 9

	UNGAPPED TO GAP COMBINATION				
	GAP TO GAP ±3%	±3%	±5%	±7%	±10%
40707	25-63	64-75	≤ 125		≤ 160
41010	25-55	56-75	≤ 125		≤ 160
41313	25-75	76-110	≤ 175	≤ 275	≤ 315
41717	25-100	101-175	≤ 275	≤ 400	≤ 630
42120	25-180	181-450	≤ 630	≤ 850	≤ 1250

Charts show type of combination and the guaranteed tolerance for corresponding  $A_L$  ranges. For special tolerances, or for  $A_L = 2000$  or higher, contact the factory.

Ranges indicated are the tolerances for standard gapped cores.

For ± 5%, ± 7%, and ± 10%, the maximum  $A_L$  for each tolerance is shown. Standard cores are manufactured to the smallest allowed tolerance.

### PQ CORES FOUND IN SECTION 10

	UNGAPPED TO GAP COMBINATION				
	GAP TO GAP ±3%	±3%	±5%	±7%	±10%
42016	60-184	185-467	≤ 755	≤ 1027	≤ 1425
42020	50-139	140-467	≤ 754	≤ 1026	≤ 1422
42610	200-396	397-777	≤ 1258	≤ 1728	≤ 1999
42614	103-334	335-645	≤ 1044	≤ 1421	≤ 1972
42620	95-296	297-888	≤ 1436	≤ 1955	≤ 1999
42625	77-234	235-880	≤ 1423	≤ 1936	≤ 1999
43214	127-416	417-548	≤ 885	≤ 1207	≤ 1661
43220	128-409	410-846	≤ 1369	≤ 1878	≤ 1999
43230	84-241	242-808	≤ 1305	≤ 1775	≤ 1999
43535	89-255	256-980	≤ 1575	≤ 1999	
44040	83-230	231-1006	≤ 1625	≤ 1999	

### LAMINATION SIZE E-CORES FOUND IN SECTION 11

	UNGAPPED TO GAP COMBINATION				
	GAP TO GAP ±3%	±3%	±5%	±7%	±10%
41203	16-27	28-55	≤ 86	≤ 117	≤ 160
41707	22-37	38-89	≤ 140	≤ 190	≤ 259
41808	27-42	43-121	≤ 192	≤ 258	≤ 355
42510	37-61	62-200	≤ 318	≤ 432	≤ 595
43009	55-91	92-222	≤ 353	≤ 475	≤ 653
43515	54-87	88-429	≤ 687	≤ 934	≤ 1284
44317	81-136	137-762	≤ 1222	≤ 1676	≤ 1999
44721	107-180	181-1188	≤ 1920	≤ 1999	
45724	129-218	219-1732	≤ 1999		

### EFD, EEM CORES FOUND IN SECTION 11

	UNGAPPED TO GAP COMBINATION				
	GAP TO GAP ±3%	±3%	±5%	±7%	±10%
41515	19-30	31-81	≤ 127	≤ 172	≤ 236
42523	41-66	67-296	≤ 475	≤ 646	≤ 888

## Gapping for $A_L$

### PLANAR E-CORES\* FOUND IN SECTION 11

	GAP TO GAP ±3%	UNGAPPED TO GAP COMBINATION			
		±3%	±5%	±7%	±10%
41425	19-37	38-76	≤ 122	≤ 166	≤ 228
41434	17-31	32-77	≤ 123	≤ 167	≤ 230
41805	18-32	33-205	≤ 329	≤ 448	≤ 617
42107	35-66	67-188	≤ 304	≤ 414	≤ 569
42216	78-141	142-405	≤ 656	≤ 892	≤ 1239
43208	118-216	217-643	≤ 1040	≤ 1427	≤ 1964
43618	119-222	223-673	≤ 1088	≤ 1491	≤ 1999
43808	173-315	316-956	≤ 1547	≤ 1999	
44008	106-189	190-507	≤ 821	≤ 1116	≤ 1548
44308	201-367	368-1130	≤ 1828	≤ 1999	
44310	169-305	306-1130	≤ 1828	≤ 1999	
45810	266-481	482-1496	≤ 1999		
46410	379-701	702-1999			
49938	336-594	595-1999			

\* These tolerances also apply to Planar E-I combinations.

### OTHER E-CORES FOUND IN SECTION 11

	GAP TO GAP ±3%	UNGAPPED TO GAP COMBINATION			
		±3%	±5%	±7%	±10%
41205	28-47	48-107	≤ 170	≤ 229	≤ 316
41810	44-74	75-235	≤ 376	≤ 512	≤ 704
42515	28-43	44-210	≤ 333	≤ 452	≤ 616
42520	107-190	191-397	≤ 643	≤ 874	≤ 1202
42530	45-72	73-409	≤ 655	≤ 891	≤ 1225
43007	42-67	68-307	≤ 491	≤ 668	≤ 919
43520	65-111	112-461	≤ 738	≤ 1003	≤ 1380
44011	59-95	96-642	≤ 1029	≤ 1400	≤ 1940
44016	52-83	84-545	≤ 872	≤ 1185	≤ 1629
44020	78-126	127-916	≤ 1480	≤ 1999	
44022	94-156	157-1187	≤ 1903	≤ 1999	
45528	113-186	187-1736	≤ 1999		
45530	129-215	216-1999			
46016	102-129	130-1231	≤ 1989	≤ 1999	
47228	120-199	200-1823	≤ 1999		
48020	99-158	159-1922	≤ 1999		

### EC CORES FOUND IN SECTION 12

	GAP TO GAP ±3%	UNGAPPED TO GAP COMBINATION			
		±3%	±5%	±7%	±10%
43517	49-79	80-438	≤ 702	≤ 954	≤ 1312
44119	61-98	99-627	≤ 1004	≤ 1365	≤ 1891
45224	76-123	124-911	≤ 1471	≤ 1999	
47035	83-135	136-1403	≤ 1999		

### ETD, EER CORES FOUND IN SECTION 12

	GAP TO GAP ±3%	UNGAPPED TO GAP COMBINATION			
		±3%	±5%	±7%	±10%
40906	15-30	31-52	53-80	81-105	106-142
43434	55-88	89-500	≤ 806	≤ 1095	≤ 1507
43521	54-86	87-566	≤ 913	≤ 1241	≤ 1707
43939	95-156	157-641	≤ 1028	≤ 1398	≤ 1935
44216	71-117	118-876	≤ 1415	≤ 1925	≤ 1999
44444	73-117	118-881	≤ 1423	≤ 1935	≤ 1999
44949	81-130	131-1075	≤ 1736	≤ 1999	
45959	51-118	119-1822	≤ 1999		

Charts show type of combination and the guaranteed tolerance for corresponding  $A_L$  ranges. For special tolerances, or for  $A_L = 2000$  or higher, contact the factory.

Ranges indicated are the tolerances for standard gapped cores.

For ± 5%, ± 7%, and ± 10%, the maximum  $A_L$  for each tolerance is shown. Standard cores are manufactured to the smallest allowed tolerance.