



Magnetic Powder Cores

ARNOLD[®]
THE MAGNETIC PRODUCTS GROUP OF **SPS**
TECHNOLOGIES

ARNOLD MAGNETICS LTD
Powder Core Division

Introduction

Arnold manufactures the world's largest selection of magnetic materials. We are magnetic specialists of both hard and soft magnetic materials. This product information guide is focused on our soft magnetic powder core products; Molybdenum Permalloy Powder, SUPER-MSS™, and HI-FLUX™.

Today, electrical design engineers need to identify and compare product capabilities, performance and effectiveness for high frequency power conversion inductors, noise filters and various tuned circuit applications to meet their design objectives. To assist in this selection process, we have included the following information:

- How to order parts
- Design information
- Formulas and definitions for design calculations
- Comparative magnetic curves for performance evaluation
- Electrical and physical specifications with part numbers
- "Q" curves for Molybdenum Permalloy Powder cores

In 1995 Arnold initiated a complete upgrade of our powder core manufacturing facility providing the most advanced equipment to process, control and monitor our products. The upgrade for Molybdenum Permalloy Powder (MPP) and HI-FLUX was completed in 1996. In early 1997 the Sendust (SUPER-MSS) upgrade was completed.

To further our commitment to Magnet Materials advancement, Arnold opened the Magnetics Technology Center (MTC) in 1996. This "state-of-the-art" magnetics development laboratory is used for new product and improved process development by Arnold and their customers.

Arnold's commitment to continuous improvement and customer satisfaction is best reflected in our commitment to excellence:

Our Commitment to Excellence

Arnold is committed to providing quality products and services that conform to our customers' requirements.

We will have an environment which encourages teamwork and in which each employee learns, understands, and practices quality conformance as an integral part of his or her job function. All departments will establish goals consistent with our commitment to continuous improvement.

We will judge our performance on how well we satisfy our customers' needs and be guided by the belief that our customers will ultimately determine how successful we will be.

We appreciate your selection of our products.

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Arnold HI-FLUX™ and SUPER-MSS™ are trademarks of The Arnold Engineering Co., a subsidiary of SPS Technologies, Inc.

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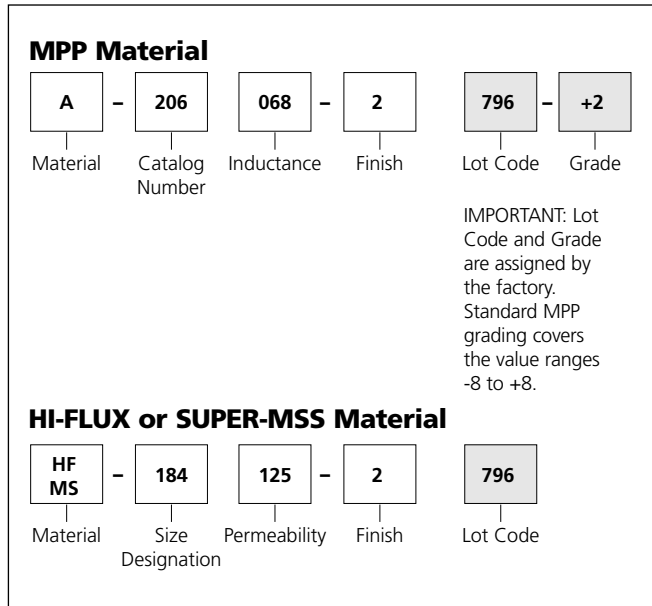
Specifications and "Q" Curves

0.140" o.d.	22-23
0.155" o.d.	24-25
0.183" o.d.	26-27
0.250" o.d.	28-29
0.260" o.d. (i.d. 0.105/ht.0.100)	30-31
0.260" o.d. (i.d. 0.105/ht.0.188)	32-33
0.277" o.d.	34-35
0.310" o.d.	36-37
0.380" o.d. (i.d. 0.188/ht.0.125)	38-39
0.380" o.d. (i.d. 0.188/ht.0.156)	40-41
0.400" o.d.	42-43
0.440" o.d.	44-45
0.500" o.d.	46-47
0.655" o.d.	48-49
0.680" o.d.	50-51
0.800" o.d.	52-53
0.900" o.d.	54-55
0.928" o.d.	56-57
1.060" o.d. (i.d. 0.580/ht.0.340)	58-59
1.060" o.d. (i.d. 0.580/ht.0.440)	60-61
1.300" o.d. (i.d. 0.785/ht.0.345)	62-63
1.300" o.d. (i.d. 0.785/ht.0.420)	64-65
1.300" o.d. (i.d. 0.785/ht.0.440)	66-67
1.350" o.d.	68-69
1.410" o.d.	70-71
1.570" o.d.	72-73
1.840" o.d. (i.d. 0.950/ht.0.710)	74-75
1.840" o.d. (i.d. 1.130/ht.0.600)	76-77
2.000" o.d.	78-79
2.250" o.d. (i.d. 1.039/ht.0.600)	80-81
2.250" o.d. (i.d. 1.400/ht.0.550)	82-83
3.063" o.d. (i.d. 1.938/ht.0.500)	84-85
3.063" o.d. (i.d. 1.938/ht.0.625)	86-87
4.000" o.d. (i.d. 2.250/ht.0.535)	88-89
4.000" o.d. (i.d. 2.250/ht.0.650)	90-91
5.218" o.d. (i.d. 3.094/ht.0.800)	92-93
5.218" o.d. (i.d. 3.094/ht.1.000)	94-95
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Core Part Number Construction

Part numbers for Arnold cores are constructed as shown below. For reference, MPP core part number A-206068-2 used in the example can be found on page 52. Note that the Permeability Rating is included in the Electrical Specifications Table. Likewise, Hi-Flux core part number HF-184125-2 can be found on page 74. Its Inductance Rating is included in the Electrical Specifications Table.



Marking

Cores with 0.655 inch and larger nominal outside diameters are individually marked with the part number, lot code and, when specified for Molybdenum Permalloy Powder (MPP) cores, the grade. Small (0.500 inch nominal outside diameter and smaller) MPP core permeability is identified, when specified, by use of a color code stripe as shown in the table below. Otherwise, marking is on the package only.

Color Stripe Code for Small MPP Cores (Used Only When Specified at Time of Order)

Permeability	Color Code
14	White
26	Black
60	Blue
125	None
147	Yellow
160	Brown
173	Orange
205	Red
250	Green
300	Violet
350	Gray

Inductance Factor Tolerance

Arnold Molybdenum Permalloy, HI-FLUX and SUPER-MSS cores are produced to a specific inductance factor based on a 1000-turn winding. These inductance tolerances, usually + or - 8%, are shown in the Electrical Specifications Table for each core size.

Inductance Factor Grading

Arnold will supply Molybdenum Permalloy Powder cores graded into 1% or 2% inductance factor groups if specified at time of order. The deviation from nominal inductance factor will be stamped on the core for 1% grading or color dot coded on the core for 2% grading according to the table shown here:

% Deviation from nominal Inductance*	% Deviation from nominal turns	Grade Stamped on core 1% Grading	Color Dot Code 2% Grading
+8 to +7 +7 to +6 +6 to +5	-4 to -3.5 -3.5 to -3 -3 to -2.5	+8 +7 +6	Gray Gray Violet
+5 to +4 +4 to +3 +3 to +2	-2.5 to -2 -2 to -1.5 -1.5 to -1	+5 +4 +3	Violet Blue Blue
+2 to +1 +1 to 0 0 to -1	-1 to -0.5 -.5 to 0 0 to +.5	+2 +1 -1	Green Green Yellow
-1 to -2 -2 to -3 -3 to -4	+.5 to +1 +1 to +1.5 +1.5 to +2	-2 -3 -4	Yellow Orange Orange
-4 to -5 -5 to -6 -6 to -7 -7 to -8	+2 to +2.5 +2.5 to +3 +3 to +3.5 +3.5 to +4	-5 -6 -7 -8	Red Red Brown Brown

* Cores ordered in 1% inductance groupings (1/2% in turns) will have the numerical value marked on the core as shown above. Packages will be marked when the core is too small to be properly marked.

Core Finishes

Refer to the table below for the finish descriptions. Finishes are tested for dielectric strength with conductive foam pads pressed against the two flat surfaces of the core. A 60 Hz, 1250 V rms test voltage is applied between the pads for one second.

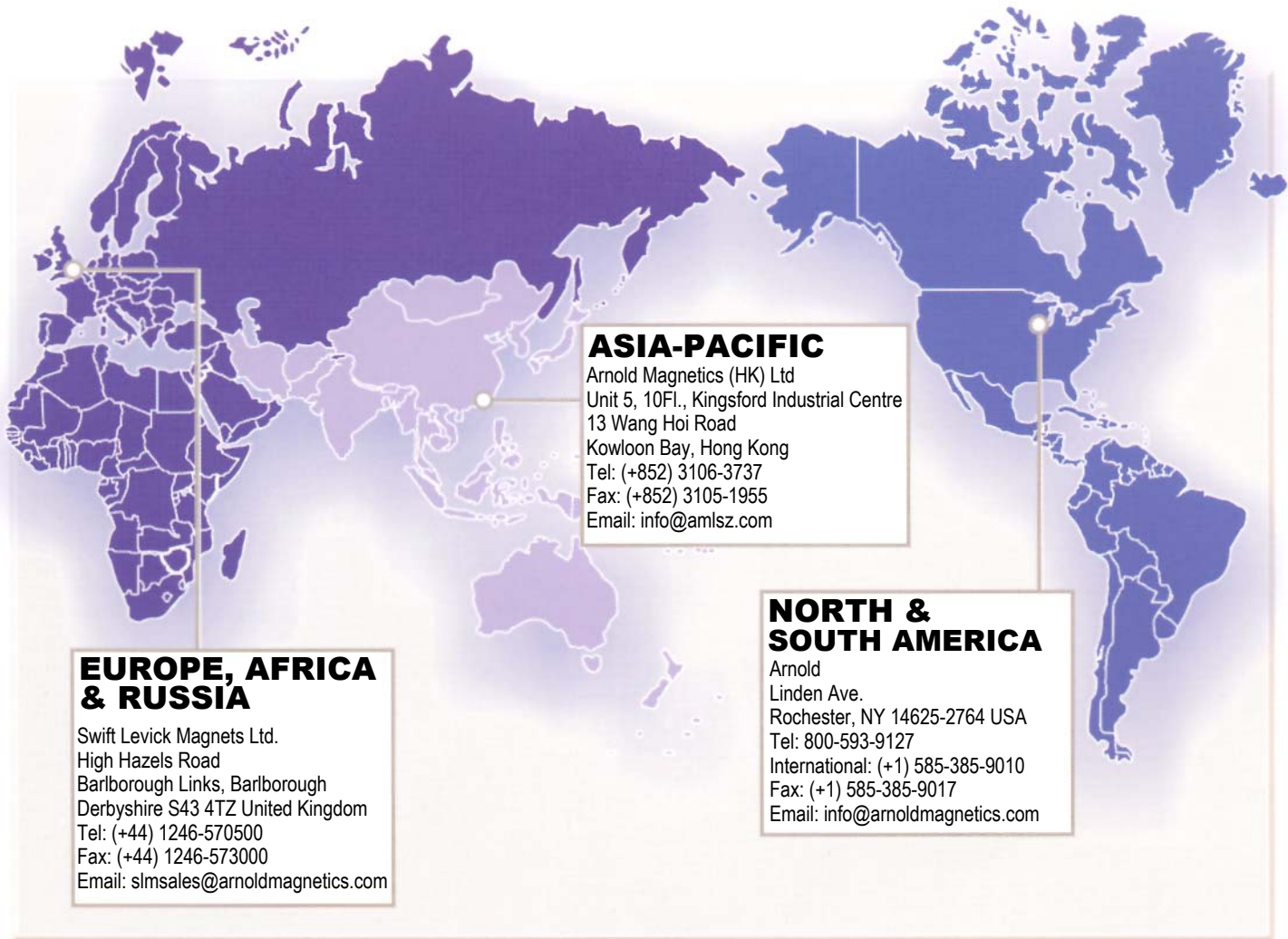
Molybdenum Permalloy, HI-FLUX and SUPER-MSS Powder Core Finishes

Nominal Outside Diameter	Finish	Appearance	Minimum Voltage Breakdown Requirement	Finish Number
0.140 to 0.183	Parylene C	Clear	None	8
0.250 to 0.380	Parylene C	Clear	500 V rms, 60 Hz	8
0.400 to 5.218	Epoxy	Blue	500 V rms, 60 Hz	2

Limited Warranty and Exclusive Remedy

Arnold Magnetics Ltd. warrants that these products conform to industry standards specific herein and will be free from defects in material and workmanship. THIS WARRANTY IS EXPRESSLY GIVEN IN LIEU OF ANY AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND IN LIEU OF ANY OTHER OBLIGATION ON THE PART OF ARNOLD MAGNETICS LTD. Arnold Magnetics Ltd. will, at its option, repair or replace free of charge (excluding all shipping and handling costs) any products which have not been subject to misuse, abuse, or modification and which in its sole determination were not manufactured in compliance with the warranty given above.

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