ARNOLD® MAGNETIC TECHNOLOGIES

Arnold Capabilities for Coated and Slit Silicon Steel

Precision Thin Metals
300 North West St.
Marengo, IL 60152
815-568-2000

Magnetic Material	Three Percent Silicon Electrical Steel								
Coating Material	AISI Type C-5 - Inorganic magnesium phosphate coating with inorganic fillers and organic resin								
Characteristic	**Width Range (Inch)**	**Tolerance (Inch unless otherwise specified)**							
		Grain Oriented				ARNON™ (Non-Oriented)			
		1-mil	2-mil	4-mil	6-mil	4-mil	5-mil	7-mil Regular	7-mil Special
Loss per ASTM A348 (Max.)	All Available	11.0 Watts per Pound @ 12 kG, 400 Hz	8.5 Watts per Pound @ 15 kG, 400 Hz	6.8 Watts per Pound @ 15 kG, 400 Hz	9.0 Watts per Pound @ 15 kG, 400 Hz	4.9 Watts per pound @ 10KG, 400 HZ	5.5 Watts per Pound @ 10 kG, 400 Hz	7.5 Watts per Pound @ 10 kG, 400 Hz	6.5 Watts per Pound @ 10 kG, 400 Hz
Thickness	All Available	±0.00010	±0.00015	±0.00020	±0.00030	±0.0002	±0.00025	±0.00035	±0.00035
Width	Up to 1.00	±0.003							
	> 1.00 and up to 9.00	±0.005							
	> 9.00 and up to 16.00	±0.010							
Burr (Maximum)	All Available	0.0001	0.0002	0.0004	0.0006	0.0004	0.0005	0.0007	0.0007
Flatness (Maximum Deviation from Flat)	All Available	0.030 per Inch of Width			0.070				
Flatness Height to Length Ratio (Max.)	All Available	5%	4%	3%					
Crossbow (Maximum Deviation from Flat)	All Available	0.250		Greater of 0.100 or 0.020 per Inch of Width					
Crossbow Height to Length Ratio (Max.)	All Available	5%	4%	3%					
Coil Set (Max. in 3 ft. Vertical)	Up to 0.500	6							
	> 0.500 and up to 16.00	3							
Camber (Max. in 8 ft.)	Up to 0.250	1.50							
	> 0.250 and up to 1.500	0.50							
	> 1.500 and up to 16.00	0.25							
Coil Size (I.D. x Max. O.D.)	Less than 0.75	6 x 20							
	0.75 to 16.00	16 x 32							
Center Type	Up To 7.00	Cardboard center							
	> 7.00 and up to 16.00	Steel Center							
Stacking Factor	All Available	Stacking Factor shall be in accordance with IEC 60404-13 for method and IEC 60404-8-8 for limits.							
Coating Thickness	All Available	Material shall be coated with an AISI Type C-5 type insulated coating to a thickness that provides a minimum insulation reistance of 10Ω/cm² per lamination when tested in accordance with ASTM A717							
Average Surface Insulation Resistivity per ASTM A 717-81 (Min.)	All Available	10 Ω cm^2 per lamination (two surfaces)							
Surface	All Available	Uniformly coated. Minimum surface irregularities such as creases, wrinkles, pinpricks, dents, scratches using the best practices of Precision Thin Metals. Surface irregularities occur randomly; no repeating irregularities within a ten-foot section are permitted.							
Miscellaneous	All Available	Non-Oriented coils may be formed by interleaving continuous lengths. Grain Oriented coils may be formed by tape splicing. All breaks will be flagged.							
As Rolled Width available upon request.									

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Table 1. Max Coil Weights for Non-Oriented and Grain Oriented Silicon Steels		
Characteristic	**Width Range (Inch)**	**Weight (Lbs)**
Coil Weights for All Gauges	Up To 4.00	70 lbs. Max
Max Coil Weights for 1-mil (When Not Slit With Narrow Widths 4.00" or less)	> 4.00 and up to 16.00	Max 100 lbs per inch of width
Max Coil Weights for 2-mil thru 7-mil (When Not Slit With Narrow Widths 4.00" or less)	> 4.00 and up to 16.00	Max 185 lbs per inch of width
Max Coil Weights for All Gauges (When Slit Simultaneously With Narrow Slit Widths 4.00" or less)	5.00	700 lbs. Max
	6.00	840 lbs. Max
	7.00	980 lbs. Max
	8.00	1120 lbs. Max
	9.00	1,260 lbs. Max
	10.00	1,400 lbs. Max
	11.00	1,540 lbs. Max
	12.00	1,680 lbs. Max
	13.00	1,820 lbs. Max
	14.00	1,960 lbs. Max
	15.00	2,100 lbs. Max

Table 2. Recommended Grain Oriented Silicon Steel Thicknesses for Various Operating Frequency Values		
Frequency	Recommended Thickness	Approximate Induction for 300 mW/cc, 18 W/lb, 40 W/kg*
400 Hz	4-mil or 6-mil	15000 G*
1 kHz	4-mil	10000 G
2 kHz	2-mil	6000 G
5 kHz	1-mil	3000 G
*For reference only. Based on Arnold C-core data records. (Arnold no longer manufactures C-cores.) At 400 Hz, magnetizing current limits the maximum flux density.		

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Table 3. Recommended Grain Oriented Silicon Steel Thicknesses for High-Power Pulse Operating Conditions*		
Pulse Width	Recommended Thickness	Pulses per Second
2 to 1000 microseconds	4-mil or 6-mil (D-U, U-I, L-L Laminations)	To 1000
0.25 to 2 microseconds	1-mil or 2-mil (C-Core)	To 1000
*Reference: **Transformers for Electronic Circuits**, Nathan R. Grossner, McGraw-Hill, New York, 1967, pp. 285 and 286, Table 11.1.		

Table 4. For Grain Oriented and Non-Oriented Silicon Steel Recommended Edge Drop For Slit Widths - All Gauges	
Recommended Edge Drop Per Side On An As Rolled Edge	0.50" minimum
Recommended Edge Drop Per Side On An As Slit Edge	0.125" minimum

Table 5. For Grain Oriented and Non-Oriented Silicon Steel - Max Number Of Breaks Per Coil				
Gauge	**Width**	**Max Number Of Breaks**		**Minimum Length Between Breaks**
1-mil	Up To 4"	5		100 ft.
1-mil	> 4" and up to 16" and As	5		100 ft.
2-mil	Up To 4"	4		100 ft.
2-mil	> 4" and up to 16" and As	5		100 ft.
4-mil	Up To 4"	3		100 ft.
4-mil	> 4" and up to 16" and As	4		100 ft.
5-mil	Up To 4"	3		400 ft.
5-mil	> 4" and up to 16" and As	4		400 ft.
6-mil	Up To 4"	3		100 ft.
6-mil	> 4" and up to 16" and As	4		100 ft.
7-mil	Up To 4"	3		400 ft.
7-mil	> 4" and up to 16" and As	4		400 ft.