ARNOLD MAGNETIC TECHNOLOGIES

Precision Thin Metals Tolerances for coated Slit and As-rolled Edge Material

Magnetic Material	Three Percent Silicon Electrical Steel
Coating Material	AISI Type C-5 - Inorganic coating (ASTM A976)

Characteristic	Width Range (Inch)	Standard Tolerances (Inch unless otherwise specified)							
		Grain Oriented				ARNON™ (Non-Oriented)			
		1-mil	2-mil	4-mil	6-mil	2-mil	4-mil	5-mil	7-mil
Loss per ASTM A348 (Max.)	All Available	11.0 Watts per (LB) @ 12 kG, 400 Hz	8.5 Watts per (LB) @ 15 kG, 400 Hz	6.8 Watts per (LB) @ 15 kG, 400 Hz	9.0 Watts per (LB) @ 15 kG, 400 Hz	6.0 Watts per (LB) @ 10 kG, 400 Hz	5.0 Watts per (LB) @ 10 kG, 400 Hz	5.5 Watts per (LB) @ 10 kG, 400 Hz	6.5 Watts per (LB) @ 10 kG, 400 Hz
Thickness	All Available	±0.00010	±0.00015	±0.00020	±0.00030	±0.00015	±0.0002	±0.00025	±0.00035
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							
Average Surface Insulation Resistivity per ASTM A 717-81 (Min.)	All Available	$10\ \Omega\ cm^2$ 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. **1 & 2 Mill material takes exception to the surface defects: Surface defects such as creases, wrinkles, dents will occur in this material randomly and it cannot be guarenteed that it will not repeat.**							
Coil Size (I.D. x Max. O.D.)	> 0.75	6 Center x 20 Max OD							
	0.75 - 16.0	16 Center x 32 Max OD							
Center Type	All widths	Material will be supplied on cardboard unless stated by customer a different center type needs to be used							
Slit Tolerances									
Width	Up to 1.00	±0.003							
	> 1.00 and up to 9.00	±0.005							
	> 9.00 and up to 17.00	±0.010							
Burr (Maximum)	All Available	0.0001	0.0002	0.0004	0.0006	0.0002	0.0004	0.0005	0.0007
Flatness (Max Deviation from Flat)	All Available	The greater of .070 or .030 per Inch of Width				the greater of .070 or .010 per Inch of Width			
Crossbow (Max Deviation from Flat)	All Available	0.500	0.250			Greater of 0.100 or 0.020 per Inch of Width			

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As-Rolled Egdes Tolerances					
Width	As rolled material	± .125			
Flatness (Maximum)	As Rolled Material	0.500 Max	0.030 per Inch of Width	0.500 Max	0.030 per Inch of Width
Crossbow (Maximum)	As Rolled Material	0.500 Max	0.020 per Inch of Width	0.500 Max	0.020 per Inch of Width
The tolerances listed below are our capabilities but are not checked on all material					
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			
The tolerances listed below are for any material uncoated that is being cut to length only					
Cut to length Machine		± .125" Up to 5 FT long	.003" - .011"	All widths	
Hand Cut to Length		± .250"	.005" - .020"	>12.0"	

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	> 4.00 and up to 17	Max 100 lbs per inch of width
Max Coil Weights for 2-mil thru 7-mil	> 4.00 and up to 17	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
	16.00	2,100 lbs. Max

	17.00	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,
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.		

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	
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

Non-Oriented coils may be formed by interleaving continuous lengths. Grain Oriented coils may be formed

Table 5. For Grain Oriented and Non-Oriented Silicon Steel - Max Number Of Breaks Per Coil

	For Slit Material		For As-Rolled Material		
Gauge	**Width**	**Max # Of Breaks**	**Width**	**Max # Of Breaks**	**Min Between Breaks**
1-mil	Up To 4"	5	As-Rolled	10	100 ft.
1-mil	> 4" and up to 17" and As Rolled	5	As-Rolled	10	100 ft.

2-mil	Up To 4"	4	As-Rolled	8	100 ft.
2-mil	> 4" and up to 17" and As Rolled	5	As-Rolled	8	100 ft.
4-mil	Up To 4"	3	As-Rolled	6	100 ft.
4-mil	> 4" and up to 17" and As Rolled	4	As-Rolled	6	100 ft.
5-mil	Up To 4"	3	As-Rolled	4	400 ft.
5-mil	> 4" and up to 17" and As Rolled	4	As-Rolled	4	400 ft.
6-mil	Up To 4"	3	As-Rolled	4	100 ft.
6-mil	> 4" and up to 17" and As Rolled	4	As-Rolled	4	100 ft.
7-mil	Up To 4"	3	As-Rolled	4	400 ft.
7-mil	> 4" and up to 17" and As Rolled	4	As-Rolled	4	400 ft.