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Wieland Thin Strip Products

Stainless Alloys

Location: 215 Piedmont Street, Waterbury, CT, 06706

Austenitic Stainless Steel															Ferritic Stainless Steel		Martensitic Stainless		PH Grade Steel
Alloy No	201	301L	301Si	301	301H	302	304	304L [6]	304H	305	316	316L [6]	321 [6]	347 [6]	409	430	410	420	PH17-7
ASTM	A666	A666		A666		A666	A666	A666	A240	A167	A666	A666	A167	A240	A176	A176	A167	A176	A693
MIL Spec. No.				S5059		S5059	S5059	S4043			S5059		S6721	S6721					S25043
AMS Spec. No.		5517 -5519	5517 -5519	5517 -5519	5517 -5519	5516	5513	5511	5513	5514	5524	5507	5510	5512		5503	5504	5506	5528
Ni min	4.0	6.15	6.4	7.0	7.5	8.0	8.0	8.0	9.25	12.0	10.0	10.0	9.0	9.0	.50 max	.75 max	.75 max	.50 max	6.5
Cr min	16	16	16	16	16	17	18	18	18	17	16	16	17	17		16	11.5	12	16
Mo max	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.8	0.75	0.75	3.0	3.0	0.75	0.75		0.50	0.50	0.50	
C max	0.15	0.15	0.15	0.15	0.15	0.15	0.08	0.03	0.08	0.12	0.08	0.03	0.08	0.08	0.08	0.12	0.15	0.4	0.09
Mn max	7.5	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
Si max	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1
N max	0.25						0.10	0.10	0.10				0.10				0.08		

Physical Properties																			
Density (lbs. per cu. in.)	0.287	0.290	0.290	0.290	0.290	0.287	0.287	0.287	0.287	0.290	0.286	0.286	0.285	0.290	0.280	0.278	0.278	0.276	0.262
Mod. of Elasticity (X 106 psi)	28.6	28	28	28	28	28	28	28	28	28	28	28	28	28	29	29	29	29	29.5
Elec. Resistivity [1]	423	432	432	432	432	432	432	432	432	432	444	444	432	436	360	360	342	330	480
Therm. Conductivity [2]	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.3	9.3	9.3	9.2	---	13.1	14.4	14.4	9.5
Coef. of Therm. Expansion [3]	8.7	9.4	9.4	9.4	9.4	9.6	9.6	9.6	9.6	9.6	8.9	8.9	9.3	9.3	6	5.8	5.5	5.7	6.1
Cost Factor [4]	0.87			0.95		1	1	1.13		1.39	1.56	1.68	1.35	1.62	---	0.73	0.76	---	2.18

Tensile Strength (x 1000 psi)																			
Annealed	100-135	140-165	140-165	110-135	100-130	75-110	90-110	90-105	90-105	80-100	80-100	80-100	80-105	80-110	55 Min	65 Min	65-95	100 Max	150 Max
1/8 Hard	110-145			110-145	110-145	110-140	110-140	110-135	110-135	100-125	100-125	100-125				95-110			
1/4 Hard	125-150			125-150	125-150	125-150	125-150	125-150	125-150	125-150	125-150	125-150				110 Min			
1/2 Hard	150-175			150-175	150-175	150-175	150-175				150-175	150-175							
3/4 Hard	175-200			175-200	175-200	175-200	175-200												180 Min (3/4C)
Full Hard	185 Min	185 Min	185 Min	185 Min	185 Min	185 Min	185 Min				175 Min	175 Min					200 Min (HT) [5]	240 Min (HT) [5]	200 Min (CondC)
Spring	200-230	200 Min	200 Min	200-230		200 Min	200 Min												
SPL Spring		270 Min Note [7]	270 Min Note [7]																

Yield Strength (x 1000 psi @ 0.2% offset)																			
Annealed	40 Min	40 Min	40 Min	35 Min	35 Min	35 Min	35 Min	30 Min	35 Min	30 Min	30 Min	30 Min	30 Min	30 Min	30 Min	35 Min	30 Min	30 Min	40 Min
1/8 Hard	55 Min			55 Min	55 Min	55 Min	55 Min	55 Min	55 Min	55 Min	55 Min	55 Min				60 Min			
1/4 Hard	75 Min			75 Min	75 Min	80 Min	80 Min	75 Min	80 Min	75 Min	75 Min	75 Min				100 Min			
1/2 Hard	110 Min			100 Min	110 Min	120 Min	120 Min				110 Min	110 Min							
3/4 Hard	135 Min			135 Min	140 Min	135 Min	135 Min												130 Min (3/4C)
Full Hard	140 Min	140 Min	140 Min	140 Min	150 Min	145 Min	145 Min				140 Min	140 Min					170 Min (HT) [5]	190 Min (HT) [5]	140 Min (CondC)
Spring	160 Min	165 Min	165 Min	160 Min		160 Min	160 Min												
SPL Spring		Note [7]	Note [7]																

Elongation (% in 2 inches)																			
Annealed	40 Min	25 Min	25 Min	40 Min	40 Min	45 Min	45 Min	40 Min	45 Min	45 Min	40 Min	40 Min	40 Min	40 Min	20 Min	20 Min	20 Min	15 Min	20 Min
1/8 Hard	30 Min			35 Min	35 Min	35 Min	35 Min	35 Min	35 Min	25 Min	30 Min	30 Min				5 Min			
1/4 Hard	25 Min			25 Min	25 Min	15 Min	15 Min	15 Min	15 Min	10 Min	10 Min	10 Min				1 Min			
1/2 Hard	15 Min			15 Min	15 Min	5 Min	5 Min				5 Min	5 Min							
3/4 Hard	7 Min			10 Min	8 Min	3 Min	3 Min												4 Min (3/4C)
Full Hard	3 Min	5 Min	5 Min	8 Min	5 Min	3 Min	1 Min				1 Min	1 Min					3 Min (HT) [5]	3 Min (HT) [5]	1 Min (CondC)
Spring	1 Min	1 Min	1 Min	1 Min		1 Min	1 Min												
SPL Spring		Note [7]	Note [7]																

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Wieland Thin Strip Products — **Copper Alloys** — **Location: 215 Piedmont Street, Waterbury, CT, 06706**

	COPPERS				HIGH PERFORMANCE ALLOYS							CUPRO-NICKELS		Cu-Ni-Sn	NICKEL SILVERS		
OLIN Alloy No.	102	110	122	1093	151	19020	19025	194	195	197	1972	7025	706	715	725	752	762	770
ASTM Spec. No.	B152	B152	B152	B152	B747	B422	B422	B465	B465	B465	B465	B422	B122	B122	B122	B122	B122	B122
Olin Alloy Name	Oxygen Free Copper	ETP Copper	DHP Copper	Ag Bearing Low O	Olin 151	Olin 19020	Olin 19025	Olin 194	Olin 195	Olin 197	Olin 1972	Olin 7025	10%Copper Nickel	30% Copper Nickel	Cu-Ni-Sn	65-18 Nickel Silver	59-12 Nickel Silver	55-18 Nickel Silver
Nominal Compostion	Cu - Min. 99.95	Cu - Min. 99.9 Oxygen .05 max	Cu - Min. 99.9 P-.015-.040	Cu- Min. 99.9 Ag Min. 13 oz./ ton	Cu - 99.9 Zr - .1	Cu - 98.4 Ni - 1 Sn - .5 P - .05	Cu - 98 Ni - 1 Sn - .9 P - .05	Cu - 97.5 Fe - 2.35 P - .03 Zn - .12	Cu - 97 Fe - 1.5 P - .18 Co - .8 Sn - .6	Cu - 99 Fe - .6 P - .2 Mg - .05	Cu - 99.4 Fe - .3 P - .1 Mg - .13	Cu - 96.2 Ni - 3 Si - .65 Mg - 0.15	Cu - 88.6 Ni - 10 Fe - 1.4	Cu - 69.4 Ni - 30 Fe - .4	Cu - 88.2 Ni - 9.5 Sn - 2.3	Cu - 65 Zn - 17 Ni - 18	Cu - 59 Zn - 29 Ni - 12	Cu - 55 Zn - 27 Ni - 18
TENSILE STRENGTH x 1000 PSI (N/mm² = KSI x 6.895) x 1000 PSI (Kgf/mm² = KSI x .7031)												**YIELD STRENGTH** x 1000 PSI (Nominal 0.2% offset) (N/mm² = KSI x 6.895) x 1000 PSI (Nominal 0.2% offset or range) (Kgf/mm² = KSI x .7031)						
ANNEALED (TM00 / AM)	26-38				37-42			40-63	50-60	43-53		90-110	43-50	52 Min	45-65	53-63	57-75	61-76
	10				13			38	28	23		65-90	19	28	21	25	36	32
1/4 HARD (TM01 / 1/4 HM)	34-42				40-45		47-69		60-72				51-67	58-72	55-75	58-72	65-81	69-87
	32				35		53		57				53	47	73 Max	45	52	63
1/2 HARD (TM02 / 1/2 HM)	37-46				43-51	58-70	63-76	53-63	68-78	53-63	56-63	95-120	58-72	66-80	65-80	66-80	75-91	78-95
	37				38	63	66	45	71	48	48	85-110	63	68	68	63	70	78
3/4 HARD (TM03)	41-50				47-56				75-85			100-125				74-86	83-98	88-101
	43				50				77			95-120				75	82	92
HARD (TM04 / HM)	43-52				53-62	65-74	72-83	60-70	82-90	60-70	60-70		71-83	75-88	75-90	78-91	90-105	92-107
	45				56	67	76	60	83	60	60		75	78	80	82	89	98
EX. HD. (TM05 / SHM)	47-56				59-65	71-80	78-89	67-73		67-73	67-73		73-85	80-92	80-95	86-98	101-114	102-115
	50				60	73	80	67		67	67		76	83	85	91	98	107
SPRING (TM06 / XHM)	50-58				64-71	77 Min	84-95	70-76	88-97	70-76	70-76		78-88	84-94	85-100	90-101	109-122	108-120
	52				66	74 Min.	87	70	88	70	70		76 Min	86	90	93	105	112
EX. SPR. (TM08 / XHMS)	52 Min						91-106	73-80		73-80					90-105	96 Min	114 Min	116 Min
	51 Min						97	73		73					95	95 Min	102 Min	115 Min
ELONGATION Nominal % in 2 inches (= % in 50mm)												**ROCKWELL B HARDNESS** Nominal-.020" gauge and over (Rockwell F, 30T, 15N or H_v where noted)						
ANNEALED (TM00 / AM)	35				38			23	26	20 Min		10 Min	35	30 Min	35	35	40	43
					49F					45F		—	75F	83F	50Max30T	85F	90F	87F
1/4 HARD (TM01 / 1/4 HM)	23				22		25		14				12	17	5 Min	24	35	26
	72F				32				71				64	74	85 Max	62	73	75
1/2 HARD (TM02 / 1/2 HM)	20				15	7	15	17	6	17	17	7 Min	5	6	10	14	18	14
	83F				37			59	78	66	68	—	73	80	80	75	84	86
3/4 HARD (TM03)	14				8				3			5 Min				8	10	8
	86F				47				81			—				81	88	90
HARD (TM04 / HM)	9				4	5	10	7	2	7	7		1 Min	3	3	5	4	4
	89F				57			71	83	69	69		81	86	82	85	92	93
EX. HD. (TM05 / SHM)	4				2	4	8	2		6	6		1 Min	2	2	3	2	1 Min
	91F				60			74		72	72		84	88	87	90	96	97
SPRING (TM06 / XHM)	3				1 Min	3	6	2	2	5	5		1 Max	1 Min	1 Min	1 Min	1 Max	1 Max
	94F				62 Min			76	85	74	74		87	89	90	92	98	98
EX. SPR. (TM08 / XHMS)	3 Max						4	2 Max		1 Min					1 Max	2 Max	1 Max	1 Max
	92 MinF							77		75					91	92 Min	98 Min	98 Min

Copper Alloys

Current Alloys: 110 151 194 197 710 715 7025 **Please ask for other alloy options

Tempers: Annealed (Grade 7) or As Rolled (Grade 5) or Tempered (½ Hard ¾ Hard Full Hard)

Thicknesses: 0.0056" (4oz – 140um – 0.142mm) down to 0.0000039**"** (1/4oz – 10um – 0.010mm)

Width: 0.5" (12.7mm) – 25.5" (647mm)

Specifications: IPC 4562a 4 oz < (0.0056") – Covers Mechanical Properties ASTM B152 5 oz > (0.0068") – Covers Mech & Chem

Cores: (ID) 3" or 6" Fiber, Phenolic, Steel cores for annealed products

Quantities: cu110 = 500 lbs – 228 kgs MoQ All other grades 4000 lbs – 1818 kgs

Remarks: Surface treatment options: 1) Bare 2) Anti- Tarnish (6 mo. Guarantee) 3) Copperbond – nodule enhancement for bonding

Stainless Alloys

Current Alloys: Austenitic – Ferritic – Precipitation Hardening (PH)

Tempers: Annealed to Spring temper (90 – 340 KSI tensile) **Custom options available.

Thicknesses: **Tempered** 0.001" (0.0254mm) to 0.020" (0.508mm) **Annealed** 0.003" (0.0762mm) to 0.020" (0.508mm)

Width: 0.5" (12.7mm) to 37" (940mm)

Specifications: AMS, ASTM, EN

Cores: (ID) 12" 16" 20"

Quantities: 2500 lbs – 1134 kgs MoQ (Based on inventory)

Remarks: Customer surface finish options (2B – Mist – Matte – Roll brush)

IPC Member

(Information on this handout is not suitable for design purposes, reference only).

CERTIFIED ISO 9001:2015 COMPANY