



Brush Performance Alloys - Strip Materials Properties (English Units)

Alloy (UNS Number)	Temper	Heat Treatment	Density	Modulus of Elasticity	0.2% Offset Yield Strength	Tensile Strength	Elongation in 2"	Electrical Conductivity	Thermal Conductivity	1000 Hour Stress Relaxation Resistance			10 ⁶ Cycle Fatigue Strength (R=-1)	90° Bend Formability (min R/t) ⁽¹⁾		Thermal Expansion Coefficient	Hardness		Composition			
										100 C	150 C	200 C		Long.	Trans.		HV/DPH	Rockwell		Weight %		
			lb/in ³	10 ⁶ psi	ksi	ksi	%	% IACS	Btu/ft hr °F				ksi			in/in °F						
Copper Beryllium	25 (C17200)	A	TB00	As Rolled	0.300	19	30 - 55	60 - 78	35 - 65	15 - 19	60				30 - 35	0.0	0.0	9.7	90-144	B45-78	98% Cu, 1.9% Be, 0.2% Co+Ni	
		1/4 H	TD01		0.300	19	60 - 80	75 - 88	20 - 45	15 - 19	60				31 - 36	0.0	0.0	9.7	121-185	B68-90		
		1/2 H	TD02		0.300	19	75 - 95	85 - 100	12 - 30	15 - 19	60				32 - 38	0.5	1.0	9.7	176-216	B88-96		
		H	TD04		0.300	19	90 - 115	100 - 120	2 - 18	15 - 19	60				35 - 39	1.0	2.9	9.7	216-287	B96-102		
		AT	TF00	3 hours @ 600°F	0.302	19	140 - 175	165 - 195	3 - 15	22 - 28	60	95	88	61	40 - 45			9.7	353-413	C36-42		
		1/4 HT	TH01	2 hours @ 600°F	0.302	19	150 - 185	175 - 205	3 - 10	22 - 28	60	96	90	62	40 - 45			9.7	353-424	C36-43		
		1/2 HT	TH02		0.302	19	160 - 195	185 - 215	1 - 8	22 - 28	60	97	88	59	42 - 47			9.7	373-435	C38-44		
		HT	TH04		0.302	19	165 - 205	190 - 220	1 - 6	22 - 28	60	98	87	55	45 - 50			9.7	373-446	C38-45		
	190 (C17200)	AM	TM00	Mill Hardened	0.302	19	70 - 95	100 - 110	16 - 30	17 - 28	60	97	61	5	40 - 45	0.0	0.0	9.7	210-251	B95-C23	98% Cu, 1.9% Be, 0.2% Co+Ni	
		1/4 HM	TM01		0.302	19	80 - 110	110 - 120	15 - 25	17 - 28	60	97	69	20	41 - 47	0.5	0.5	9.7	230-271	C20-26		
		1/2 HM	TM02		0.302	19	95 - 125	120 - 135	12 - 22	17 - 28	60	97	66	26	42 - 48	0.5	1.0	9.7	250-301	C23-30		
		HM	TM04		0.302	19	110 - 135	135 - 150	9 - 20	17 - 28	60	98	74	28	45 - 52	2.0	2.0	9.7	285-343	C28-35		
		SHM	TM05		0.302	19	125 - 140	150 - 160	9 - 18	17 - 28	60	98			47 - 55	2.8	3.2	9.7	309-363	C31-37		
		XHM	TM06		0.302	19	135 - 170	155 - 175	4 - 15	17 - 28	60	98	86	52	50 - 57	4.0	5.0	9.7	317-378	C32-38		
		XHMS	TM08		0.302	19	150 - 180	175 - 190	3 - 12	17 - 28	60	98	84	47	50 - 60	5.0	10.0	9.7	325-413	C33-42		
		290 (C17200)	TM02		TM02	Mill Hardened	0.302	19	95 - 115	120 min.	14 - 30	17 - 26	60	97	90	59	42 - 48	0.0	0.0	9.7		255-339
	TM03		TM03	0.302	19		110 - 125	135 min.	12 min.	17 - 26	60				-	0.5	0.5	9.7				
	TM04		TM04	0.302	19		115 - 135	140 min.	9 - 25	17 - 26	60	98	86	33	44 - 50	0.7	0.7	9.7	285-369	C28-38		
	TM06		TM06	0.302	19		135 - 155	155 min.	6 - 13	17 - 26	60	99	93	68	47 - 57	1.5	1.5	9.7	317-393	C32-40		
	TM08		TM08	0.302	19		155 - 175	175 min.	3 - 15	17 - 26	60	99			50 - 60	3.5	3.0	9.7	345-429	C35-43		
	390 (C17460)	HT	TH04	Mill Hardened	0.318	20	135 - 153	138 - 158	1 min.	44 min.	128	95	85	69	30 - 40	2.0 ⁽²⁾ 5.0 ⁽³⁾	2.0 ⁽²⁾ 5.0 ⁽³⁾	9.8	280-340	C27-35	98% Cu, 0.4% Be, 1.2% Ni, 0.3% Zr, 0.2% Sn	
	390E (C17500)	EHT	TH04	Mill Hardened	0.319	20	138 min.	143 min.	2 min.	42 min.	120	95	85	69		0.5 ⁽⁴⁾ 2.0 ⁽⁵⁾ 2.5 ⁽⁶⁾ 3.5 ⁽⁷⁾	0.5 ⁽⁴⁾ 2.5 ⁽⁵⁾ 3.5 ⁽⁶⁾ 3.5 ⁽⁷⁾	9.8	300 min.	C29 min.	97% Cu, 0.6% Be, 2.6% Co	
	3 (C17510)	AT	TF00	Mill	0.319	20	80 - 100	100 - 130	10 - 25	45 - 60	140	94	83	63	38 - 44	1.0	1.0	9.8	195-275	B92-100	98% Cu, 0.4% Be, 1.8% Ni	
		HT	TH04	Hardened	0.319	20	95 - 120	110 - 135	8 - 20	48 - 60	140	95	85	66	42 - 47	2.0	2.0	9.8	216-287	B95-102		
10 (C17500)	AT	TF00	Mill	0.319	20	80 - 100	100 - 130	10 - 25	45 - 60	115	94	83	63	38 - 44	1.0	1.0	9.8	195-275	B92-100	97% Cu, 0.6% Be, 2.6% Co		
	HT	TH04	Hardened	0.319	20	95 - 120	110 - 135	8 - 20	48 - 60	115	95	85	66	42 - 47	2.0	2.0	9.8	216-287	B95-102			
174 (C17410)	1/2 HT	TH02	Mill	0.318	20	80 - 100	95 - 115	10 - 20	50 min.	135	94	82	64	45 - 50	0.5	0.5	9.8	180-230	B89-98	99% Cu, 0.4% Be, 0.5% Co		
	HT	TH04	Hardened	0.318	20	100 - 120	110 - 130	7 - 17	45 - 60	135	95	85	77	45 - 50	1.2	5.0	9.8	210-278	B95-102			
Brush 60® (C17460)	3/4 HT	TH03	Mill	0.318	20	95 - 115	115 - 135	11 min.	50 min.	128	96	85	65	40 - 45	0.7	0.7	9.8	220-280	B96-C30	98% Cu, 0.4% Be, 1.2% Ni, 0.3% Zr, 0.2% Sn		
	HT	TH04	Hardened	0.318	20	105 - 125	120 - 140	10 min.	50 min.	128	96	89	75	40 - 45	1.5	1.5	9.8	230-290	B98-C31			
Nickel Beryllium	360 (N03360)	A		As Rolled	0.299	28 - 30	40 - 70	95 - 130	30 min.	4 min.	28	greater than 95% stress remaining after 10,000 hours at 200 C			0.0	0.0	8.0	106-200	A39-57	97% Ni, 2.0% Be, 0.5% Ti		
		1/4 H			0.299	28 - 30	65 - 125	110 - 150	15 min.	4 min.	28				0.0	0.0	8.0	153-293	A50-65			
		1/2 H			0.299	28 - 30	115 - 170	130 - 175	4 min.	4 min.	28				0.7	1.2	8.0	160-383	A51-70			
		H			0.299	28 - 30	150 - 190	155 - 190	1 min.	4 min.	28				1.2	2.0	8.0	180-491	A55-75			
		AT		2.5 hours @ 950°F	0.299	28 - 30	150 min.	215 min.	12 min.	6 min.	28						8.0	343-528	15N 78-86			
		1/4 HT		950°F	0.299	28 - 30	175 min.	230 min.	10 min.	6 min.	28						8.0	383-598	15N 80-88			
		1/2 HT		1.5 hours @ 950°F	0.299	28 - 30	200 min.	245 min.	9 min.	6 min.	28						8.0	395-695	15N 81-90			
		HT			0.299	28 - 30	230 min.	270 min.	8 min.	6 min.	28						8.0	446-695	15N 83-90			
		MH2		Mill Hardened	0.299	28 - 30	100 - 125	155 - 180	14 min.	5 min.	28								8.0			
		MH4			0.299	28 - 30	120 - 155	180 - 205	12 min.	5 min.	28							0.0	0.0		8.0	
		MH6			0.299	28 - 30	150 - 175	200 - 225	10 min.	5 min.	28							0.5	0.5		8.0	
		MH8			0.299	28 - 30	170 - 205	220 - 245	9 min.	5 min.	28							1.0	1.2		8.0	
		MH10			0.299	28 - 30	200 - 225	240 - 270	8 min.	5 min.	28							1.2	1.6		8.0	
					0.299	28 - 30	200 - 225	240 - 270	8 min.	5 min.	28							1.5	2.2		8.0	
		0.299	28 - 30		220 - 245	260 - 290	8 min.	5 min.	28						2.0	3.0	8.0					
		0.299	28 - 30		220 - 245	260 - 290	8 min.	5 min.	28						2.0	3.0	8.0					

Notes: (1) Typical formability values for strip 0.010" thick. Formability improves as thickness decreases.

(2) For strip 0.004" and thinner.

(3) For strip greater than 0.004" thick.

(4) For strip 0.002" and thinner

(5) For strip thicker than 0.002" up to 0.004"

(6) For strip thicker than 0.004" up to 0.006"

(7) For strip thicker than 0.006" up to 0.008"

(8) For strip 0.005" and thinner

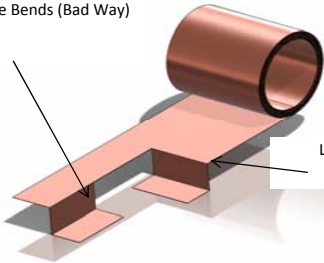


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	Alloy (UNS Number)	Temper	Heat Treatment	Density	Modulus of Elasticity	0.2% Offset Yield Strength	Tensile Strength	Elongation in 2"	Electrical Conductivity	Thermal Conductivity	1000 Hour Stress Relaxation Resistance			10 ⁷ Cycle Fatigue Strength (R _m)	90° Bend Formability (min R/t)		Thermal Expansion Coefficient	Hardness		Composition			
											100 C	150 C	200 C		Long.	Trans.		in/in °F	HV/DPH		Rockwell	Weight %	
Copper Nickel Tin	BrushForm® 158 (C72900)	A	TB00	As Rolled	0.325	21	25 - 45	64 - 85	32 min.	7	22					0.0	0.0	9.1	100-150	B55-80	77% Cu, 15% Ni, 8% Sn		
		1/4 H	TD01		0.325	21	52 - 75	75 - 100	18 min.	7	22					0.0	0.0	9.1	150-235	B80-99			
		1/2 H	TD02		0.325	21	75 - 100	85 - 110	8 min.	7	22					0.0	0.5	9.1	190-275	B91-C27			
		H	TD04		0.325	21	95 - 125	100 - 130	1 min.	7	22					0.5	3.0	9.1	220-300	B96-C30			
		EH	TD08		0.325	21	115 - 135	122 - 145	1 min.	7	22					-	-	9.1	265-325	C27-33			
		AT	TX00		0.325	21	100 - 130	120 - 150	6 min.	7	22							9.1	275-350	C26-36			
		1/4 HT	TS01		0.325	21	115 - 145	130 - 160	4 min.	7	22							9.1	290-365	C28-37			
		1/2 HT	TS02		0.325	21	135 - 165	145 - 175	3 min.	7	22							9.1	315-390	C31-40			
		HT	TS04		0.325	21	155 - 185	165 - 195	2 min.	7	22							9.1	335-410	C34-42			
		EHT	TS08		0.325	21	170 - 200	175 - 205	1 min.	7	22							9.1	370-450	C37-45			
		TM00	TM00	0.325	21	75 - 95	95 - 115	22 min.	7	22					0.0	0.0	9.1	190-290	B91-C29				
		TM02	TM02	0.325	21	90 - 110	105 - 125	15 min.	7	22					0.0	0.0	9.1	215-315	B96-C32				
		TM04	TM04	0.325	21	105 - 125	115 - 135	10 min.	7	22					1.0	1.0	9.1	245-345	C22-35				
		TM06	TM06	0.325	21	120 - 145	130 - 150	6 min.	7	22					2.0	2.0	9.1	270-370	C26-38				
		TM08	TM08	0.325	21	140 - 170	150 - 178	2 min.	7	22	94	84	70		5.0	8.0	9.1	305-405	C30-41				
		TM10	TM10	0.325	21	165 - 195	175 - 210	1 min.	7	22					-	-	9.1	370-450	C37-45				
		BrushForm® 96 (C72900)	A	TB00	As Rolled	0.322	18	37 nom	60 nom	30 min.	10	30					0.0	0.0	9.0	100-150		B55-80	85% Cu, 9% Ni, 6% Sn
			1/4 H	TD01		0.322	18	53 nom	75 nom	16 min.	10	30					1.1	1.7	9.0	125 min.		B70 min.	
			1/2 H	TD02		0.322	18	67 nom	85 nom	8 min.	10	30					1.5	2.0	9.0	-		-	
			H	TD04		0.322	18	88 nom	100 nom	3 min.	10	30					3.0	6.0	9.0	175-275		B95-C27	
EH	TD08		0.322	18		92 nom	110 nom	-	10	30					-	-	9.0	-	-				
AT	TX00		0.322	18		75 nom	100 nom	15 min.	10	30							9.0	250-340	C23-35				
1/4 HT	TS01		0.322	18		90 nom	115 nom	10 min.	10	30							9.0	230-330	B98-C34				
1/2 HT	TS02		0.322	18		100 nom	125 nom	6 min.	10	30							9.0	280-330	C27-C34				
HT	TS04		0.322	18		120 nom	135 nom	4 min.	10	30							9.0	300-370	C30-C38				
TM00	TM00		0.322	18		55 - 85	90 - 110	16 min.	10	30					0.2	0.2	9.0	180-280	B89-C27				
TM02	TM02		0.322	18	70 - 100	100 - 120	12 min.	10	30					5.0	0.5	9.0	200-300	B93-C30					
TM04	TM04		0.322	18	85 - 115	110 - 130	8 min.	10	30					1.0	1.0	9.0	230-300	B98-C30					
TM06	TM06		0.322	18	90 - 130	120 - 140	4 min.	10	30					2.5	3.0	9.0	240-360	C21-C37					
TM08	TM08		0.322	18	100 - 140	130 - 160	-	10	30					5.0	7.0	9.0	260-380	C24-C39					

Notes: (1) Typical formability values for strip 0.010". Formability improves as thickness decreases.

Transverse Bends (Bad Way)



Longitudinal Bends (Good Way)

The formability ratio R/t is defined as the ratio of the minimum inside bend radius (R) to the strip thickness (t) that forms a 90 degree bend without fracture.