



Brush Performance Alloys - Strip Materials Properties (SI Units)

Alloy (UNS Number)	Temper	Heat Treatment	Density	Modulus of Elasticity	0.2% Offset Yield Strength	Tensile Strength	Elongation in 50 mm	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			
			g/cm ³	GPa	MPa	MPa	%	% IACS	W/m K	100 C	150 C	200 C	MPa	Long.	Trans.	mm/mm °C	HV/DPH	Rockwell	Weight %			
Copper Beryllium	25 (C17200)	A	As Rolled	8.30	131	190 - 380	410 - 540	35 - 65	15 - 19	105				207 - 241	0.0	0.0	17.5	90-144	B45-78	98% Cu, 1.9% Be, 0.2% Co+Ni		
		1/4 H		TD01	8.30	131	410 - 560	510 - 610	20 - 45	15 - 19	105				214 - 248	0.0	0.0	17.5	121-185		B68-90	
		1/2 H		TD02	8.30	131	510 - 660	580 - 690	12 - 30	15 - 19	105				221 - 262	0.5	1.0	17.5	176-216		B88-96	
		H		TD04	8.30	131	620 - 800	680 - 830	2 - 18	15 - 19	105				241 - 269	1.0	2.9	17.5	216-287		B96-102	
		AT	TF00	3 hours @ 315°C	8.36	131	960 - 1210	1130 - 1350	3 - 15	22 - 28	105	95	88	61	276 - 310			17.5	353-413		C36-42	
		1/4 HT	TH01		8.36	131	1030 - 1300	1190 - 1420	3 - 10	22 - 28	105	96	90	62	276 - 310			17.5	353-424		C36-43	
		1/2 HT	TH02		8.36	131	1100 - 1350	1270 - 1490	1 - 8	22 - 28	105	97	88	59	290 - 324			17.5	373-435		C38-44	
		HT	TH04		8.36	131	1130 - 1420	1310 - 1520	1 - 6	22 - 28	105	98	87	55	310 - 345			17.5	373-446		C38-45	
	190 (C17200)	AM	TM00	Mill Hardened	8.36	131	480 - 660	690 - 760	16 - 30	17 - 28	105	97	61	5	276 - 310	0.0	0.0	17.5	210-251		B95-C23	
		1/4 HM	TM01		8.36	131	550 - 760	750 - 830	15 - 25	17 - 28	105	97	69	20	283 - 324	0.5	0.5	17.5	230-271		C20-26	
		1/2 HM	TM02		8.36	131	650 - 870	820 - 940	12 - 22	17 - 28	105	97	66	26	290 - 331	0.5	1.0	17.5	250-301		C23-30	
		HM	TM04		8.36	131	750 - 950	930 - 1040	9 - 20	17 - 28	105	98	74	28	310 - 359	2.0	2.0	17.5	285-343		C28-35	
		SHM	TM05		8.36	131	860 - 970	1030 - 1110	9 - 18	17 - 28	105	98			324 - 379	2.8	3.2	17.5	309-363		C31-37	
		XHM	TM06		8.36	131	930 - 1180	1060 - 1250	4 - 15	17 - 28	105	98	86	52	345 - 393	4.0	5.0	17.5	317-378		C32-38	
		XHMS	TM08		8.36	131	1030 - 1250	1200 - 1320	3 - 12	17 - 28	105	98	84	47	345 - 414	5.0	10.0	17.5	325-413		C33-42	
		290 (C17200)	TM02		TM02	8.36	131	650 - 800	820 min	14 - 30	17 - 26	105	97	90	59	290 - 331	0.0	0.0	17.5		255-339	C25-34
	TM03		TM03	8.36	131	760 - 860	930 min	12 min	17 - 26	105				-	0.5	0.5	17.5					
	TM04		TM04	8.36	131	790 - 940	960 min	9 - 25	17 - 26	105	98	86	33	304 - 345	0.7	0.7	17.5	285-369	C28-38			
	TM06		TM06	8.36	131	930 - 1070	1060 min	6 - 13	17 - 26	105	99	93	68	324 - 393	1.5	1.5	17.5	317-393	C32-40			
	TM08		TM08	8.36	131	1060 - 1210	1200 min	3 - 15	17 - 26	105	99			345 - 414	3.5	3.0	17.5	345-429	C35-43			
	390 (C17460)	HT	TH04	Mill Hardened	8.80	138	930 - 1055	950 - 1090	1 min	44 min.	235	95	85	69	207 - 275	2.0 ⁽²⁾	2.0 ⁽²⁾	17.6	280-340		C27-35	98% Cu, 0.4% Be, 1.2% Ni, 0.3% Zr, 0.2% Sn
	390E (C17500)	EHT	TH04	Mill Hardened	8.83	138	951 min	986 min	2 min	42 min.	208	95	85	69		0.5 ⁽⁴⁾	0.5 ⁽⁴⁾	17.6	300 min		C29 min	97% Cu, 0.6% Be, 2.6% Co
																2.0 ⁽⁵⁾	2.5 ⁽⁵⁾					
																2.5 ⁽⁶⁾	3.5 ⁽⁶⁾					
3.5 ⁽⁷⁾																3.5 ⁽⁷⁾						
3 (C17510)	AT	TF00	Mill Hardened	8.83	138	550 - 690	690 - 900	10 - 25	45 - 60	240	94	83	63	262 - 304	1.0	1.0	17.6	195-275	B92-100	98% Cu, 0.4% Be, 1.8% Ni		
	HT	TH04	8.83	138	650 - 870	750 - 940	8 - 20	48 - 60	240	95	85	66	290 - 324	2.0	2.0	17.6	216-287	B95-102				
10 (C17500)	AT	TF00	Mill Hardened	8.83	138	550 - 690	690 - 900	10 - 25	45 - 60	200	94	83	63	262 - 304	1.0	1.0	17.6	195-275	B92-100	97% Cu, 0.6% Be, 2.6% Co		
	HT	TH04	8.83	138	650 - 870	750 - 940	8 - 20	48 - 60	200	95	85	66	290 - 324	2.0	2.0	17.6	216-287	B95-102				
174 (C17410)	1/2 HT	TH02	Mill Hardened	8.80	138	550 - 690	650 - 800	10 - 20	50 min.	230	94	82	64	310 - 345	0.5	0.5	17.6	180-230	B89-98	99% Cu, 0.4% Be, 0.5% Co		
	HT	TH04	8.80	138	690 - 830	750 - 900	7 - 17	45 - 60	230	95	85	77	310 - 345	1.2	5.0	17.6	210-278	B95-102				
Brush 60® (C17460)	3/4 HT	TH03	Mill Hardened	8.80	138	650 - 800	790 - 940	11 min	50 min.	235	96	85	65	275 - 310	0.7	0.7	17.6	220-280	B96-C30	98% Cu, 0.4% Be, 1.2% Ni, 0.3% Zr, 0.2% Sn		
	HT	TH04	8.80	138	720 - 870	820 - 970	10 min	50 min.	235	96	89	75	275 - 310	1.5	1.5	17.6	230-290	B98-C31				
Nickel Beryllium	360 (N03360)	A	As Rolled	8.28	193-207	270 - 490	650 - 900	30 min	4 min.	48	greater than 95% stress remaining after 10,000 hours at 200 C				0.0	0.0	14.4	106-200	A39-57			
		1/4 H		8.28	193-207	440 - 870	750 - 1040	15 min	4 min.	48					0.0	0.0	14.4	153-293	A50-65			
		1/2 H		8.28	193-207	790 - 1180	890 - 1210	4 min	4 min.	48					0.7	1.2	14.4	160-383	A51-70			
		H		8.28	193-207	1030 - 1320	1060 - 1340	1 min	4 min.	48					1.2	2.0	14.4	180-491	A55-75			
		AT	2.5 hours @ 510°C	8.28	193-207	1000 - 1200	1480 min	12 min	6 min.	48					483 - 552	14.4	343-528	15N 78-86				
		1/4 HT		8.28	193-207	1050 - 1300	1580 min	10 min	6 min.	48					455 - 524	14.4	383-598	15N 80-88				
		1/2 HT		8.28	193-207	1100 - 1350	1680 min	9 min	6 min.	48					427 - 496	14.4	395-695	15N 81-90				
		HT		8.28	193-207	1150 - 1400	1860 min	8 min	6 min.	48					434 - 503	14.4	446-695	15N 83-90				
		MH2	Mill Hardened	8.28	193-207	690 - 870	1060 - 1250	14 min	5 min.	48					0.0	0.0	14.4					
		MH4		8.28	193-207	820 - 1070	1240 - 1420	12 min	5 min.	48					400 - 469	0.5	0.5	14.4				
		MH6		8.28	193-207	1030 - 1210	1370 - 1560	10 min	5 min.	48						1.0	1.2	14.4				
		MH8		8.28	193-207	1170 - 1420	1510 - 1690	9 min	5 min.	48					427 - 496	1.2	1.6	14.4				
		MH10		8.28	193-207	1380 - 1560	1650 - 1870	8 min	5 min.	48						1.5	2.2	14.4				
		MH12		8.28	193-207	1510 - 1860	1790 - 2000	8 min	5 min.	48					434 - 503	2.0	3.0	14.4				

Notes: (1) Typical formability values for strip 0.25 mm thick. Formability improves as thickness decreases.
 (2) For strip 0.10 mm and thinner.

(5) For strip thicker than 0.05 mm up to 0.10 mm
 (6) For strip thicker than 0.10 mm up to 0.15 mm

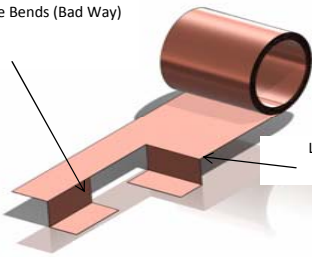


Brush Performance Alloys - Strip Materials Properties (SI Units)

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 ⁸ Cycle Fatigue Strength (R=-1) MPa	90° Bend Formability (min R/t) (°)		Thermal Expansion Coefficient mm/mm °C	Hardness		Composition																		
										100 C	150 C	200 C		Long.	Trans.		HV/DPH	Rockwell		Weight %																	
Copper Nickel Tin BrushForm® 158 (C72900)	A	TB00	9.00	144	170 - 310	440 - 590	32 min	7	38						0.0	0.0	16.4	100-150	B55-80	77% Cu, 15% Ni, 8% Sn																	
	1/4 H	TD01																			As Rolled	9.00	144	360 - 520	520 - 690	18 min	7	38					0.0	0.0	16.4	150-235	B80-99
	1/2 H	TD02																			9.00	144	520 - 690	590 - 760	8 min	7	38					0.0	0.5	16.4	190-275	B91-C27	
	H	TD04																			9.00	144	660 - 860	690 - 900	1 min	7	38					0.5	3.0	16.4	220-300	B96-C30	
	EH	TD08																			9.00	144	790 - 930	840 - 1000	1 min	7	38					-	-	16.4	265-325	C27-33	
	AT	TX00																			3 hours @ 700°F	9.00	144	690 - 900	830 - 1030	6 min	7	38							16.4	275-350	C28-36
	1/4 HT	TS01																			9.00	144	790 - 1000	900 - 1100	4 min	7	38								16.4	290-365	C28-37
	1/2 HT	TS02																			9.00	144	930 - 1140	1000 - 1210	3 min	7	38								16.4	315-390	C31-40
	HT	TS04																			9.00	144	1070 - 1280	1140 - 1340	2 min	7	38								16.4	335-410	C34-42
	EHT	TS08																			9.00	144	1170 - 1380	1205 - 1415	1 min	7	38								16.4	370-450	C37-45
	TM00	TM00																			Mill Hardened	9.00	144	520 - 660	660 - 790	22 min	7	38					0.0	0.0	16.4	190-290	B91-C29
	TM02	TM02																				9.00	144	620 - 760	720 - 860	15 min	7	38					0.0	0.0	16.4	215-315	B96-C32
	TM04	TM04																				9.00	144	720 - 860	790 - 930	10 min	7	38					1.0	1.0	16.4	245-345	C22-35
	TM06	TM06																				9.00	144	830 - 1000	900 - 1030	6 min	7	38					2.0	2.0	16.4	270-370	C26-38
	TM08	TM08																				9.00	144	970 - 1170	1030 - 1230	2 min	7	38	94	84	70		5.0	8.0	16.4	305-405	C30-41
	TM10	TM10																				9.00	144	1140 - 1345	1205 - 1450	1 min	7	38					-	-	16.4	370-450	C37-45
	TM08	TM08																				9.00	144	1140 - 1345	1205 - 1450	1 min	7	38					-	-	16.4	370-450	C37-45
Copper Nickel Tin BrushForm® 96 (C72700)	A	TB00	8.91	124	255 nom	414 nom	30 min	10	52						0.0	0.0	16.2	100-150	B55-80	85% Cu, 9% Ni, 6% Sn																	
	1/4 H	TD01																			As Rolled	8.91	124	365 nom	517 nom	16 min	10	52					1.1	1.7	16.2	125 min	B70 min
	1/2 H	TD02																				8.91	124	462 nom	586 nom	8 min	10	52					1.5	2.0	16.2	-	-
	H	TD04																				8.91	124	607 nom	689 nom	3 min	10	52					3.0	6.0	16.2	175-275	B95-C27
	EH	TD08																				8.91	124	634 nom	758 nom	-	10	52					-	-	16.2	-	-
	AT	TX00																				8.91	124	517 nom	689 nom	15 min	10	52							16.2	250-340	C23-35
	1/4 HT	TS01																				8.91	124	620 nom	793 nom	10 min	10	52							16.2	230-330	B98-C34
	1/2 HT	TS02																				8.91	124	689 nom	862 nom	6 min	10	52							16.2	280-330	C27-C34
	HT	TS04																			8.91	124	827 nom	931 nom	4 min	10	52							16.2	300-370	C30-C38	
	TM00	TM00																			Mill Hardened	8.91	124	414 min	676 nom	16 min	10	52					0.2	0.2	16.2	180-280	B89-C27
	TM02	TM02																				8.91	124	517 min	724 nom	12 min	10	52					5.0	0.5	16.2	200-300	B93-C30
	TM04	TM04																				8.91	124	621 min	758 nom	8 min	10	52					1.0	1.0	16.2	230-300	B98-C30
	TM06	TM06																				8.91	124	689 min	827 nom	4 min	10	52					2.5	3.0	16.2	240-360	C21-C37
	TM08	TM08																				8.91	124	758 min	896 nom	-	10	52					5.0	7.0	16.2	260-380	C24-C39
	TM08	TM08																				8.91	124	758 min	896 nom	-	10	52					5.0	7.0	16.2	260-380	C24-C39
	TM08	TM08																				8.91	124	758 min	896 nom	-	10	52					5.0	7.0	16.2	260-380	C24-C39

Notes: (1) Typical formability values for strip 0.25 mm thick. 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.