



Properties of Materion Brush Performance Alloys Rod, Bar & Tube (English Units)

	Alloy (UNS Number)	Temper	Heat Treatment	Diameter	Density	Modulus of Elasticity	0.2% Offset Yield Strength	Tensile Strength	Elongation in 2"	Electrical Conductivity	Thermal Conductivity at 100°C	10 ⁷ Cycle Fatigue Strength (R=-1)	Thermal Expansion Coefficient	Rockwell Hardness	Chemical Composition		
															Weight %		
				in	lb/in ³	Mpsi	ksi	ksi	%	% IACS	Btu/ft hr °F	ksi	in/in °F	B or C	Weight %		
Copper Beryllium	25 (C17200) & M25 (C17300)	A	TB00	As Drawn	0.030 to 15.0	0.300	19	20 - 35	60 - 85	20 - 60	15 - 20	45	-	9.7	B45 - 85	Alloy 25 97.4-98% Cu, 1.8-2.0% Be, 0.2-0.6% Co+Ni	
		H	TD04		0.030 to 0.375	0.300	19	75 - 105	90 - 130	8 - 30	15 - 20	45	-	9.7	B88 - 103		
					Over 0.375 to 1.0	0.300	19	75 - 105	90 - 125	8 - 30	15 - 20	45	-	9.7	B88 - 102		
					Over 1.0 to 3.0	0.300	19	75 - 105	85 - 120	8 - 20	15 - 20	45	-	9.7	B88 - 101		
		AT	TF00	3 hours @ 600-625°F	0.030 to 3.0	0.302	19	145 - 175	165 - 200	4 - 10	25 - 30	75	30 - 40	9.7	C36 - 42		
					Over 3.0 to 14.0	0.302	19	130 - 175	165 - 200	3 - 10	25 - 30	75	30 - 40	9.7	C36 - 42		
			HT	TH04	2-3 hours @ 600-625°F	0.030 to 0.375	0.302	19	160 - 200	185 - 225	2 - 9	25 - 30	75	55 - 65	9.7	C39 - 45	Alloy M25 96.8-97.6% Cu, 1.8-2.0% Be, 0.2-0.6% Co+Ni, 0.2-0.6% Pb
			Over 0.375 to 1.0	0.302		19	155 - 195	180 - 220	2 - 9	25 - 30	75	55 - 65	9.7	C38 - 44			
			Over 1.0 to 3.0	0.302		19	145 - 190	175 - 215	4 - 9	25 - 30	75	50 - 60	9.7	C37 - 44			
		25 (C17200)	DST / ATO	-	-	1 to 7	0.302	19	110 min.	140 min.	12 min.	30 - 35	90	30 - 60	9.7	-	97.4-98% Cu, 1.8-2.0% Be, 0.2-0.6% Co+Ni
					7 to 11	0.302	19	100 min.	135 min.	13 min.	30 - 35	90	30 - 60	9.7	-		
					Over 11	0.302	19	90 min.	120 min.	13 min.	30 - 35	90	30 - 60	9.7	-		
		165 (C17000)	A	TB00	As Drawn	0.030 to 15.0	0.300	19	20 - 35	60 - 85	20 - 60	15 - 20	45	-	9.7	B45 - 85	97.6-98.2% Cu, 1.6-1.8% Be, 0.2-0.6% Co+Ni
	H		TD04	0.030 to 0.375		0.300	19	75 - 105	90 - 130	8 - 30	15 - 20	45	-	9.7	B92 - 103		
				Over 0.375 to 1.0		0.300	19	75 - 105	90 - 125	8 - 30	15 - 20	45	-	9.7	B91 - 102		
				Over 1.0 to 3.0		0.300	19	75 - 105	85 - 120	8 - 20	15 - 20	45	-	9.7	B88 - 101		
	AT		TF00	3 hours @ 600-625°F	0.030 to 3.0	0.304	19	125 - 155	150 - 190	4 - 10	25 - 30	75	-	9.7	C32 - 39		
					Over 3.0 to 14.0	0.304	19	125 - 155	150 - 190	3 - 10	25 - 30	75	-	9.7	C32 - 39		
		HT	TH04	2-3 hours @ 600-625°F	0.030 to 0.375	0.304	19	145 - 185	170 - 210	2 - 5	25 - 30	75	-	9.7	C35 - 41		
		Over 0.375 to 1.0	0.304		19	145 - 185	170 - 210	2 - 5	25 - 30	75	-	9.7	C35 - 41				
		Over 1.0 to 3.0	0.304		19	135 - 175	165 - 200	4 - 9	22 - 30	75	-	9.7	C34 - 39				
	3 (C17510) & 10 (C17500)	A	TB00	As Drawn	0.030 to 10.0	0.319	20	10 - 30	35 - 55	20 - 35	20 - 30	60	-	9.8	B20 - 50	Alloy 3 - 97.2-98.4% Cu, 0.2-0.6% Be, 1.4-2.2% Ni	
H		TD04	0.030 to 3.0		0.319	20	50 - 75	65 - 80	10 - 15	20 - 30	60	-	9.8	B60 - 80			
AT		TF00	3 hours @ 900°F	0.030 to 10.0	0.319	20	80 - 100	100 - 130	10 - 25	45 - 60	145	35 - 45	9.8	B92 - 100	Alloy 10 - 96.6-97.2% Cu, 0.4-0.7% Be, 2.4-2.7% Co		
HT		TH04	2 hours @ 900°F	0.030 to 3.0	0.319	20	95 - 125	110 - 140	5 - 25	13 - 14	145	-	9.8	B95 - 102			
	310	AT/HT	TF00/TH04	-	0.87 to 8.0/ 0.23 to 0.95	0.318	19.6	96 - 107	104 - 119	10 - 14	45	-	9.8	B98 min.	96.7-98% Cu, 0.8-1.3% Ni, 0.8-1.3% Co, 0.4-0.7% Be		
Copper Nickel Tin	ToughMet® 2 (C96970)	CX	-	-	2 to 12	0.322	17	90 min.	105 min.	3 min.	13 - 14	30	25 - 35	9.0	C27 min.	84-86%Cu, 8.5-9.5%Ni, 5.5-6.5%Sn	
	ToughMet® 3 (C96900)	CX90	-	-	1.5 to 3.0	0.325	21	90 min.	105 min.	6 min.	7 - 8	22	-	9.1	C27 min.	76-78%Cu, 14.5-15.5%Ni, 7.5-8.5% Sn	
		CX 105	-	-	1.5 to 3.0	0.325	21	105 min.	110 min.	4 min.	7 - 8	22	35 - 45	9.1	C30 min.		
	ToughMet® 3 (C72900)	AT90	-	-	-	1.0 to 4.0	0.325	21	90 min.	110 min.	15 min.	7 - 8	22	-	9.1	C22 min.	76-78%Cu, 14.5-15.5%Ni, 7.5-8.5% Sn
						4.0 to 9.0	0.325	21	90 min.	110 min.	12 min.	7 - 8	22	-	9.1	C22 min.	
		AT110	-	-	-	0.595 to 4.0	0.325	21	110 min.	125 min.	10 min.	7 - 8	22	40 - 60	9.1	C30 min.	
						4.0 to 9.0	0.325	21	110 min.	125 min.	6 min.	7 - 8	22	40 - 60	9.1	C30 min.	
		TS 120U	-	-	-	0.5 to 3.25	0.325	21	110 min.	125 min.	15 min.	7 - 8	22	-	9.1	C23 min.	
					0.4 to 0.75	0.325	21	150 min.	165 min.	7 min.	< 7	22	-	8.9	C36 min.		
				0.75 to 1.6	0.325	21	150 min.	165 min.	5 min.	< 8	22	-	8.9	C34 min.			
				1.6 to 3.25	0.325	21	150 min.	160 min.	3 min.	< 7	22	-	8.9	C34 min.			
MoldMAX®	MoldMAX® HH	-	-	-	All Sizes	0.302	19	145	170	5	25 - 30	75	45	9.7	C40	97.4-98% Cu, 1.8-2.0% Be, 0.2-0.6% Co+Ni	
	MoldMAX® LH	-	-	-	All Sizes	0.302	19	110	140	15	30 - 35	90	45	9.7	C30	97.4-98% Cu, 1.8-2.0% Be, 0.2-0.6% Co+Ni	
	MoldMAX® XL	-	-	-	All Sizes	0.322	17	105	115	6	13 - 14	40	30 - 35	9.0	C30	84-86%Cu, 8.5-9.5%Ni, 5.5-6.5%Sn	
	MoldMAX® SC	-	-	-	All Sizes	0.319	20	90	105	15	50 - 55	145	40	9.8	C20	97.2-98.4% Cu, 0.2-0.6% Be, 1.4-2.2% Ni	
	MoldMAX® V	-	-	-	All Sizes	0.314	18.5	105	125	7	30 - 39	92	35	9.7	C28	91.25-89.25 Cu, 6.5-7.5 Ni, 1.5-2.0 Si, 0.75-1.25 Cr	
Other Alloys	C95510 (C95510)	-	TQ50	-	0.25 - 4.0	0.272	16	62.5 min.	105 min.	9 min.	7	24	-	9.0	-	77.1-83.9%Cu, 9.7-10.9%Al, 4.4-5.5%Ni, 2.0-3.5%Fe,	
				-	4.0 - 17.0	0.272	16	56 min.	95 min.	9 min.	7	24	-	9.0	-		
	C18000	AT	TF00	-	1.0 to 14	0.320	18.5	70	90	14	45 min.	120	-	9.7	B90 min.	95.4-97.7%Cu, 1.8-3.0%Ni, 0.4-0.8%Si, 0.1-0.8%Cr	
		HT	TH04	-	0.625 to 1.0	0.320	18.5	75	95	14	45 min.	120	-	9.7	B92 min.		
	FormaMet®	-	-	-	1.57 to 11.8	0.251	16	-	-	-	6	20	-	9.0	C39	Proprietary Composition Die Bronze	



Properties of Materion Brush Performance Alloys Plate and Rolled Bar Materials (English Units)

	Alloy (UNS Number)	Temper		Heat Treatment	Thickness	Density	Modulus of Elasticity	0.2% Offset Yield Strength	Tensile Strength	Elongation in 2"	Electrical Conductivity	Thermal Conductivity at 100°C	Thermal Expansion Coefficient	Rockwell Hardness	Chemical Composition
					in	lb/in ³	Mpsi	ksi	ksi	%	% IACS	Btu/ft hr °F	in/in °F	B or C	Weight %
Copper Beryllium	25 (C17200)	A	TB00	As Rolled	0.50 to 8.0	0.300	19	20 - 35	60 - 85	20 - 60	15 - 20	45	9.7	B45 - 85	97.4-98% Cu, 1.8-2.0% Be, 0.2-0.6% Co+Ni
		H	TD04		0.188 to 0.375	0.300	19	75 - 105	90 - 130	8 - 20	15 - 20	45	9.7	B91 - 103	
					Over 0.375 to 1.0	0.300	19	75 - 105	90 - 125	8 - 20	15 - 20	45	9.7	B90 - 102	
					Over 1.0 to 2.0	0.300	19	75 - 105	85 - 120	8 - 20	15 - 20	45	9.7	B88 - 102	
				Over 2.0 to 3.0	0.300	19	75 - 105	85 - 120	8 - 20	25 - 30	45	9.7	B88 - 102		
		AT	TF00	3 hours @ 625°F	.50 to 8.0	0.302	19	140 - 175	165 - 200	3 - 10	25 - 30	75	9.7	C36 - 41	
		HT	TH04	2 hours @ 625°F	0.188 to 0.375	0.302	19	160 - 200	180 - 215	1 - 5	25 - 30	75	9.7	C38 - 45	
					Over 0.375 to 1.0	0.302	19	155 - 200	180 - 220	1 - 5	25 - 30	75	9.7	C38 - 44	
	Over 1.0 to 2.0				0.302	19	150 - 200	175 - 215	2 - 5	25 - 30	75	9.7	C37 - 43		
	Over 2.0 to 3.0				0.302	19	130 - 180	165 - 200	2 - 5	25 - 30	75	9.7	C36 - 42		
	165 (C17000)	A	TB00	As Rolled	0.50 to 8.0	0.300	19	20 - 35	60 - 85	20 - 60	15 - 20	45	9.7	B45 - 85	97.6-98.2% Cu, 1.6-1.8% Be, 0.2-0.6% Co+Ni
		H	TD04		0.188 to 0.375	0.300	19	75 - 105	90 - 130	8 - 20	15 - 20	45	9.7	B92 - 103	
					Over 0.375 to 1.0	0.300	19	75 - 105	90 - 125	8 - 20	15 - 20	45	9.7	B91 - 102	
					Over 1.0 to 2.0	0.300	19	75 - 105	85 - 120	8 - 20	15 - 20	45	9.7	B88 - 101	
				Over 2.0 to 3.0	0.300	19	75 - 105	85 - 120	8 - 20	15 - 20	45	9.7	B88 - 101		
		AT	TF00	3 hours @ 625°F	0.50 to 8.0	0.304	19	130 - 155	150 - 190	3 - 10	25 - 30	75	9.7	C33 - 39	
		HT	TH04	2 hours @ 625°F	0.188 to 0.375	0.304	19	135 - 165	170 - 210	2 - 5	25 - 30	75	9.7	C35 - 41	
					Over 0.375 to 1.0	0.304	19	135 - 165	170 - 210	2 - 5	25 - 30	75	9.7	C35 - 41	
	Over 1.0 to 2.0				0.304	19	135 - 165	165 - 200	2 - 5	25 - 30	75	9.7	C34 - 39		
	Over 2.0 to 3.0				0.304	19	125 - 165	160 - 190	2 - 5	25 - 30	75	9.7	C34 - 38		
3 (C17510) & 10 (C17500)	A	TB00	As Rolled	1.75 to 5.0	0.319	20	25 - 45	35 - 55	20 - 35	20 - 30	60	9.8	B20 - 45	Alloy 3 - 97.2-98.4% Cu, 0.2-0.6% Be, 1.4-2.2% Ni	
	H	TD04		0.188 to 3.0	0.319	20	55 - 80	70 - 85	2 - 8	20 - 30	60	9.8	B78 - 88		
	AT	TF00	3 hours @ 900°F	1.75 to 5.0	0.319	20	80 - 100	100 - 130	8 - 20	45 - 60	145	9.8	B92 - 100	Alloy 10 - 96.6-97.2% Cu, 0.4-0.7% Be, 2.4-2.7% Co	
	HT	TH04	2 hours @ 900°F	0.188 to 3.0	0.319	20	100 - 120	110 - 140	5 - 15	48 - 60	145	9.8	B95 - 102		
310	AT	TF00/TH04	-	All Sizes	0.318	19.6	96 - 107	104 - 119	10 - 14	45	135	9.8	B98 min.	96.7-98% Cu, 0.8-1.3%Ni, 0.8-1.3%Co, 0.4-0.7% Be	
Copper Nickel Tin	ToughMet® 2 (C96970)	CX	-	-	2.0 to 12.0	0.322	17	90 min.	105 min.	3 min.	13 - 14	30	9.0	C27 min.	84-86%Cu, 8.5-9.5%Ni, 5.5-6.5%Sn
	ToughMet® 3 (C72900)	AT110	-	-	0.15 to 4.5	0.325	21	110 min.	125 min.	6 min.	7 - 8	22	9.1	C30 min.	76-78%Cu, 14.5-15.5%Ni, 7.5-8.5% Sn
MoldMAX®	MoldMAX® HH	-	-	-	All Sizes	0.302	19	145	170	5	25 - 30	75	9.7	C40	97.4-98% Cu, 1.8-2.0% Be, 0.2-0.6% Co+Ni
	MoldMAX® LH	-	-	-	All Sizes	0.302	19	110	140	15	30 - 35	90	9.7	C30	97.4-98% Cu, 1.8-2.0% Be, 0.2-0.6% Co+Ni
	MoldMAX® XL	-	-	-	All Sizes	0.322	17	105	115	6	13 - 14	40	9.0	C30	84-86%Cu, 8.5-9.5%Ni, 5.5-6.5%Sn
	MoldMAX® SC	-	-	-	All Sizes	0.319	20	90	105	15	50 - 55	145	9.8	C20	97.2-98.4% Cu, 0.2-0.6% Be, 1.4-2.2% Ni
	MoldMAX® V	-	-	-	All Sizes	0.314	18.5	105	125	7	30 - 39	92	9.7	C28	91.25-89.25 Cu, 6.5-7.5 Ni, 1.5-2.0 Si, 0.75-1.25 Cr
Other Alloys	C18000	AT	TF00	-	0.5 to 8.0	0.320	18.5	75	95	14	45 min.	120	9.7	B92 min.	95.4-97.7%Cu, 1.8-3.0%Ni, 0.4-0.8%Si, 0.1-0.8%Cr
	FormaMet®	-	-	-	1.5 to 7.0	0.251	16	-	-	<0.5%	6	20	9.0	C39	Proprietary Composition Die Bronze