



Properties of Materion Brush Performance Alloys Rod, Bar and Tube Materials (SI Units)

	Alloy (UNS Number)	Temper		Heat Treatment	Diameter	Density	Modulus of Elasticity	0.2% Offset Yield Strength	Tensile Strength	Tensile Elongation in 50 mm	Electrical Conductivity	Thermal Conductivity at 100°C	10 <sup>7</sup> Cycle Fatigue Strength (R=-1)	Thermal Expansion Coefficient	Rockwell Hardness	Chemical Composition	
		BW	ASTM														mm
Copper Beryllium	25 (C17200) & M25 (C17300)	A	TB00	As Drawn	0.76 to 355.6	8.30	131	130 - 250	410 - 590	20 - 60	15 - 20	80	-	17.5	B45 - 85	Alloy 25 97.4-98% Cu, 1.8-2.0% Be, 0.2-0.6% Co+Ni	
		H	TD04		0.76 to 9.5	8.30	131	520 - 720	620 - 900	8 - 30	15 - 20	80	-	17.5	B88 - 103		
					Over 9.5 to 25.4	8.30	131	520 - 720	620 - 860	8 - 30	15 - 20	80	-	17.5	B88 - 102		
					Over 25.4 to 76	8.30	131	520 - 720	590 - 830	8 - 20	15 - 20	80	-	17.5	B88 - 101		
		AT	TF00	3 hours @ 315-330°C	0.76 to 76	8.36	131	1000 - 1210	1140 - 1380	4 - 10	25 - 30	130	210 - 280	17.5	C36 - 42		
				Over 76 to 355.6	8.36	131	900 - 1210	1140 - 1380	3 - 10	25 - 30	130	210 - 280	17.5	C36 - 42			
				Over 76 to 9.5	8.36	131	1100 - 1380	1280 - 1550	2 - 9	25 - 30	130	380 - 450	17.5	C39 - 45			
				Over 9.5 to 25.4	8.36	131	1070 - 1340	1240 - 1520	2 - 9	25 - 30	130	380 - 450	17.5	C38 - 44			
			Over 25.4 to 76	8.36	131	1000 - 1310	1210 - 1480	4 - 9	25 - 30	130	340 - 410	17.5	C37 - 44				
	25 (C17200)	DST / ATO	-	-	25 to 180	8.36	131	760 min.	970 min.	12 min.	30 - 35	155	200 - 400	17.5	-	97.4-98% Cu, 1.8-2.0% Be, 0.2-0.6% Co+Ni	
					180 to 280	8.36	131	690 min.	930 min.	13 min.	30 - 35	155	200 - 400	17.5	-		
					Over 280	8.36	131	620 min.	830 min.	13 min.	30 - 35	155	200 - 400	17.5	-		
	165 (C17000)	A	TB00	As Drawn	0.76 to 355.6	8.30	131	130 - 250	410 - 590	20 - 60	15 - 20	80	-	17.5	B45 - 85	97.6-98.2% Cu, 1.6-1.8% Be, 0.2-0.6% Co+Ni	
		H	TD04		0.76 to 9.5	8.30	131	520 - 720	620 - 900	8 - 30	15 - 20	80	-	17.5	B92 - 103		
					Over 9.5 to 25.4	8.30	131	520 - 720	620 - 860	8 - 30	15 - 20	80	-	17.5	B91 - 102		
					Over 25.4 to 76	8.30	131	520 - 720	590 - 830	8 - 20	15 - 20	80	-	17.5	B88 - 101		
AT		TF00	3 hours @ 315-330°C	0.76 to 76	8.41	131	860 - 1070	1030 - 1310	4 - 10	25 - 30	130	-	17.5	C32 - 39			
			Over 76 to 355.6	8.41	131	860 - 1070	1030 - 1310	3 - 10	25 - 30	130	-	17.5	C32 - 39				
			Over 76 to 9.5	8.41	131	1000 - 1280	1170 - 1450	2 - 5	25 - 30	130	-	17.5	C35 - 41				
			Over 9.5 to 25.4	8.41	131	1000 - 1280	1170 - 1450	2 - 5	25 - 30	130	-	17.5	C35 - 41				
		Over 25.4 to 76	8.41	131	930 - 1210	1140 - 1380	4 - 9	22 - 30	130	-	17.5	C34 - 39					
3 (C17510) & 10 (C17500)	A	TB00	As Drawn	0.76 to 254	8.83	138	70 - 210	240 - 380	20 - 35	20 - 30	105	-	17.6	B20 - 50	Alloy 3 - 97.2-98.4% Cu, 0.2-0.6% Be, 1.4-2.2% Ni		
	H	TD04		0.76 to 76	8.83	138	350 - 520	450 - 550	10 - 15	20 - 30	105	-	17.6	B60 - 80			
	AT	TF00	3 hours @ 480°C	0.76 to 254	8.83	138	550 - 690	690 - 900	10 - 25	45 - 60	250	250 - 310	17.6	B92 - 100		Alloy 10 - 96.6-97.2% Cu, 0.4-0.7% Be, 2.4-2.7% Co	
	HT	TH04	2 hours @ 480°C	0.76 to 76	8.83	138	660 - 860	760 - 970	5 - 25	13 - 14	250	-	17.6	B95 - 102			
310	AT/HT	TF00/TH04	-	23 to 203/5.8 to 24.1	8.8	135	660 - 740	720 - 820	10 - 14	45	235	-	17.6	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	-	-	51 to 305	8.91	117	620 min.	720 min.	3 min.	13 - 14	52	170 - 250	16.2	C27 min.	84-86%Cu, 8.5-9.5%Ni, 5.5-6.5%Sn	
	ToughMet® 3 (C96900)	CX90	-	-	38.1 to 76.2	9.00	144	620 min.	720 min.	6 min.	7 - 8	38	-	16.4	C27 min.	76-78%Cu, 14.5-15.5%Ni, 7.5-8.5% Sn	
		CX 105	-	-	38.1 to 76.2	9.00	144	720 min.	760 min.	4 min.	7 - 8	38	250 - 310	16.4	C30 min.		
	ToughMet® 3 (C72900)	AT90	-	-	-	25.4 to 100	9.00	144	620 min.	760 min.	15 min.	7 - 8	38	-	16.4	C22 min.	76-78%Cu, 14.5-15.5%Ni, 7.5-8.5% Sn
						100 to 228.6	9.00	144	620 min.	760 min.	12 min.	7 - 8	38	-	16.4	C22 min.	
		AT110	-	-	-	15.1 to 100	9.00	144	760 min.	860 min.	10 min.	7 - 8	38	280 - 410	16.4	C30 min.	
						100 to 228.6	9.00	144	760 min.	860 min.	6 min.	7 - 8	38	280 - 410	16.4	C30 min.	
		TS 120U	-	-	-	19 to 82	9.00	144	760 min.	860 min.	15 min.	7 - 8	38	-	16.4	C23 min.	
						10 - 19	9.00	144	1035 min.	1138 min.	7 min.	< 7	38	-	16.1	C36 min.	
	TS 160U	-	-	-	19 - 41	9.00	144	1035 min.	1138 min.	5 min.	< 7	38	-	16.1	C34 min.		
				41 to 82	9.00	144	1035 min.	1105 min.	3 min.	< 7	38	-	16.1	C34 min.			
MoldMAX®	MoldMAX® HH	-	-	-	All Sizes	8.36	131	1000	1175	5	25 - 30	130	310	17.5	C40	97.4-98% Cu, 1.8-2.0% Be, 0.2-0.6% Co+Ni	
	MoldMAX® LH	-	-	-	All Sizes	8.36	131	760	965	15	30 - 35	155	310	17.5	C30	97.4-98% Cu, 1.8-2.0% Be, 0.2-0.6% Co+Ni	
	MoldMAX® XL	-	-	-	All Sizes	8.91	117	725	795	6	13 - 14	70	210 - 240	16.2	C30	84-86%Cu, 8.5-9.5%Ni, 5.5-6.5%Sn	
	MoldMAX® SC	-	-	-	All Sizes	8.83	138	620	725	15	50 - 55	250	280	17.6	C20	97.2-98.4% Cu, 0.2-0.6% Be, 1.4-2.2% Ni	
	MoldMAX® V	-	-	-	All Sizes	8.69	128	725	860	7	30 - 39	160	250	17.5	C28	91.25-89.25 Cu, 6.5-7.5 Ni, 1.5-2.0 Si, 0.75-1.25 Cr	
Other Alloys	C95510	-	TQ50	-	6.35 - 100	7.53	110	430 min.	720 min.	9 min.	7	42	-	16.2	-	77.1-83.9%Cu, 9.7-10.9%Al, 4.4-5.5%Ni, 2.0-3.5%Fe,	
					100 - 432	7.53	110	390 min.	660 min.	9 min.	7	42	-	16.2	-		
	C18000	AT	TF00	-	25.4 to 355.6	8.86	128	480	620	14	45 min.	208	-	17.5	B90 min.	95.4-97.7%Cu, 1.8-3.0%Ni, 0.4-0.8%Si, 0.1-0.8%Cr	
		HT	TH04	-	16 to 25.4	8.86	128	520	660	14	45 min.	208	-	17.5	B92 min.		
FormaMet®	-	-	-	40 to 300	6.94	110	-	-	-	-	6	33	-	16.2	C39	Proprietary Composition Die Bronze	



## Properties of Materion Brush Performance Alloys Plate and Rolled Bar (SI Units)

	Alloy (UNS Number)	Temper		Heat Treatment	Thickness	Density	Modulus of Elasticity	0.2% Offset Yield Strength	Tensile Strength	Tensile Elongation in 50 mm	Electrical Conductivity	Thermal Conductivity at 100°C	Thermal Expansion Coefficient	Rockwell Hardness	Chemical Composition
		BW	ASTM												
Copper Beryllium	25 (C17200)	A	TB00	As Rolled	12.7 to 203.2	8.30	131	130 - 250	410 - 590	20 - 60	15 - 20	80	17.5	B45 - 85	97.4-98% Cu, 1.8-2.0% Be, 0.2-0.6% Co+Ni
		H	TD04		4.78 to 9.5	8.30	131	520 - 720	620 - 900	8 - 20	15 - 20	80	17.5	B91 - 103	
					Over 9.5 to 25.4	8.30	131	520 - 720	620 - 860	8 - 20	15 - 20	80	17.5	B90 - 102	
					Over 25.4 to 51	8.30	131	520 - 720	590 - 830	8 - 20	15 - 20	80	17.5	B88 - 102	
		AT	TF00	3 hours @ 330°C	12.7 to 203.2	8.36	131	970 - 1200	1140 - 1380	3 - 10	25 - 30	130	17.5	C36 - 41	
		HT	TH04	2 hours @ 330°C	4.78 to 9.5	8.36	131	1100 - 1380	1240 - 1490	1 - 5	25 - 30	130	17.5	C38 - 45	
					Over 9.5 to 25.4	8.36	131	1060 - 1380	1240 - 1520	1 - 5	25 - 30	130	17.5	C38 - 44	
					Over 25.4 to 51	8.36	131	1030 - 1380	1200 - 1490	2 - 5	25 - 30	130	17.5	C37 - 43	
	Over 51 to 76				8.36	131	890 - 1250	1140 - 1380	2 - 5	25 - 30	130	17.5	C36 - 42		
	165 (C17000)	A	TB00	As Rolled	12.7 to 203.2	8.30	131	130 - 250	410 - 590	20 - 60	15 - 20	80	17.5	B45 - 85	97.6-98.2% Cu, 1.6-1.8% Be, 0.2-0.6% Co+Ni
		H	TD04		4.78 to 9.5	8.30	131	520 - 720	620 - 900	8 - 20	15 - 20	80	17.5	B92 - 103	
					Over 9.5 to 25.4	8.30	131	520 - 720	620 - 860	8 - 20	15 - 20	80	17.5	B91 - 102	
					Over 25.4 to 51	8.30	131	520 - 720	590 - 830	8 - 20	15 - 20	80	17.5	B88 - 101	
		AT	TF00	3 hours @ 330°C	12.7 to 203.2	8.41	131	890 - 1070	1030 - 1310	3 - 10	25 - 30	130	17.5	C33 - 39	
		HT	TH04	2 hours @ 330°C	4.78 to 9.5	8.41	131	930 - 1140	1170 - 1450	2 - 5	25 - 30	130	17.5	C35 - 41	
					Over 9.5 to 25.4	8.41	131	930 - 1140	1170 - 1450	2 - 5	25 - 30	130	17.5	C35 - 41	
					Over 25.4 to 51	8.41	131	930 - 1140	1140 - 1380	2 - 5	25 - 30	130	17.5	C34 - 39	
	Over 51 to 76				8.41	131	860 - 1140	1100 - 1310	2 - 5	25 - 30	130	17.5	C34 - 38		
3 (C17510) & 10 (C17500)	A	TB00	As Rolled	44.5 to 127	8.83	138	170 - 310	240 - 380	20 - 35	20 - 30	105	17.6	B20 - 45	Alloy 3 - 97.2-98.4% Cu,	
	H	TD04		4.78 to 76	8.83	138	380 - 550	480 - 590	2 - 8	20 - 30	105	17.6	B78 - 88		
	AT	TF00	3 hours @ 480°C	44.5 to 127	8.83	138	550 - 690	690 - 900	8 - 20	45 - 60	250	17.6	B92 - 100	Alloy 10 - 96.6-97.2% Cu,	
	HT	TH04	2 hours @ 480°C	4.78 to 76	8.83	138	690 - 830	760 - 970	5 - 15	48 - 60	250	17.6	B95 - 102		
310	AT/HT	TF00/TH04	-	All Sizes	8.8	135	660 - 740	720 - 820	10 - 14	45	235	17.6	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	-	-	50.8 to 304.8	8.91	117	620 min.	720 min.	3 min.	13 - 14	52	16.2	C27 min.	84-86%Cu, 8.5-9.5%Ni, 5.5-6.5%Sn
	ToughMet® 3 (C72900)	AT110	-	-	3.8 to 114.3	9.00	144	760 min.	860 min.	6 min.	7 - 8	38	16.4	C30 min.	76-78%Cu, 14.5-15.5%Ni, 7.5-8.5% Sn
MoldMAX®	MoldMAX® HH	-	-	-	All Sizes	8.36	131	1000	1175	5	25 - 30	130	17.5	C40	97.4-98% Cu, 1.8-2.0% Be, 0.2-0.6% Co+Ni
	MoldMAX® LH	-	-	-	All Sizes	8.36	131	760	965	15	30 - 35	155	17.5	C30	97.4-98% Cu, 1.8-2.0% Be, 0.2-0.6% Co+Ni
	MoldMAX® XL	-	-	-	All Sizes	8.91	117	725	795	6	13 - 14	70	16.2	C30	84-86%Cu, 8.5-9.5%Ni, 5.5-6.5%Sn
	MoldMAX® SC	-	-	-	All Sizes	8.83	138	620	725	15	50 - 55	250	17.6	C20	97.2-98.4% Cu, 0.2-0.6% Be, 1.4-2.2% Ni
	MoldMAX® V	-	-	-	All Sizes	8.69	128	725	860	7	30 - 39	160	17.5	C28	91.25-89.25 Cu, 6.5-7.5 Ni, 1.5-2.0 Si, 0.75-1.25 Cr
Other Alloys	C18000	-	-	-	12.7 to 203.2	8.86	128	520	660	14	45 min.	208	17.5	B92 min.	95.4-97.7%Cu, 1.8-3.0%Ni, 0.4-0.8%Si, 0.1-0.8%Cr
	FormaMet®	-	-	-	38.1 to 177.8	6.94	110	-	-	<0.5%	6	33	16.2	C39	Proprietary Composition Die Bronze