



## Properties of Materion Performance Alloys Rod and Drawn Bar (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 <sup>7</sup> Cycle Fatigue Strength (R=-1)	Thermal Expansion Coefficient	Rockwell Hardness	Chemical Composition	
																	in
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		
				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)	DSTO-1 DSTO-2	-	-	1.0 to 6.0	0.302 0.302	19 19	110 min. 100 min.	140 min. 135 min.	10 min.*** 12 min.***	30 - 35 30 - 35	90 90	30 - 60 30 - 60	9.7 9.7	C26 min. C26 min.	97.4-98% Cu, 1.8-2.0% Be, 0.2-0.6% Co+Ni
		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			
HT		TH04	2 hours @ 900°F	0.030 to 3.0	0.319	20	95 - 125	110 - 140	5 - 25	48 - 60	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	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	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	
		CX105	-	-	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	TX00	-	1.0 to 4.0	0.325	21	90 min.	110 min.	15 min.	7 - 8	22	-	9.1	C22 min.		
					4.0 to 9.0	0.325	21	90 min.	110 min.	12 min.	7 - 8	22	-	9.1	C22 min.		
		AT110	TX00	-	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.		
		TS95	TSXX	-	0.75 to 3.25	0.325	21	95 min.	106 min.	18 min.†	< 7	22	-	8.9	B97 min.		
					0.75 to 3.25	0.325	21	110 min.	120 min.	15 min.‡	7 - 8	22	40 - 60	9.1	C24 min.		
		TS120U	TSXX	-	0.25 to 0.4	0.325	21	150 min.	160 min.	7 min.	< 7	22	-	8.9	C32 min.		
					0.41 to 0.75	0.325	21	150 min.	165 min.	7 min.	< 7	22	-	8.9	C36 min.		
	TS160U	TSXX	-	0.76 to 1.6	0.325	21	150 min.	165 min.	5 min.	< 7	22	40 - 60	8.9	C34 min.			
1.61 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	
	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.		

\* AT (TF00) and HT (TH04) tempers of copper beryllium are available for purchase only in diameters greater than or equal to 0.4375".

For smaller diameters, the material may only be purchased in A (TB00) or H (TD04) tempers, and then subsequently heat treated to AT or HT temper per the time and temperature in the table above.

\*\* M25 (C17300) Rod available in diameters less than or equal to 1.875"

\*\*\* DSTO tempers have an average CVN value of 11 ft-lbs, with no test value less than 10 ft-lbs.

† TS95 has an average CVN of 30 ft-lbs with no value less than 24 ft-lbs.

‡ TS120U has an average CVN of 15 ft-lbs for rod ≤ 1.6" and 12 ft-lbs for rod > 1.6".



## Properties of Materion Performance Alloys Tube (English Units)

	Alloy (UNS Number)		Temper	Heat Treatment	Outer Diameter*	Density	Modulus of Elasticity	0.2% Offset Yield Strength	Tensile Strength	Elongation in 2"	Electrical Conductivity	Thermal Conductivity at 100°C	10 <sup>7</sup> Cycle Fatigue Strength (R=-1)	Thermal Expansion Coefficient	Rockwell Hardness	Chemical Composition	
																	in
Copper Beryllium	25 (C17200)	A	TB00	As Drawn or As Extruded	0.75 to 16.0	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	
					0.030 to 0.375	0.300	19	75 - 105	90 - 130	8 - 30	15 - 20	45	-	9.7	B88 - 103		
		H	TD04		0.376 to 1.0	0.300	19	75 - 105	90 - 125	8 - 30	15 - 20	45	-	9.7	B88 - 102		
					1.01 to 3.0	0.300	19	75 - 105	85 - 120	8 - 20	15 - 20	45	-	9.7	B88 - 101		
		AT	TF00		0.030 to 3.0	0.302	19	145 - 175	165 - 200	4 - 10	25 - 30	75	30 - 40	9.7	C36 - 42		
					3.1 to 16.0	0.302	19	130 - 175	165 - 200	3 - 10	25 - 30	75	30 - 40	9.7	C36 - 42		
	HT	TH04	0.030 to 0.375	0.302	19	160 - 200	185 - 225	2 - 9	25 - 30	75	55 - 65	9.7	C39 - 45				
			0.376 to 1.0	0.302	19	155 - 195	180 - 220	2 - 9	25 - 30	75	55 - 65	9.7	C38 - 44				
	DSTO-1 DSTO-2	-	-	1.01 to 3.0	0.302	19	145 - 190	175 - 215	4 - 9	25 - 30	75	50 - 60	9.7	C37 - 44			
				0.030 to 0.375	0.302	19	110 min.	140 min.	10 min.**	30 - 35	90	30 - 60	9.7	C26 min.			
	165 (C17000)	A	TB00	As Drawn or As Extruded	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
					0.030 to 0.375	0.300	19	75 - 105	90 - 130	8 - 30	15 - 20	45	-	9.7	B92 - 103		
		H	TD04		0.376 to 1.0	0.300	19	75 - 105	90 - 125	8 - 30	15 - 20	45	-	9.7	B91 - 102		
					1.01 to 3.0	0.300	19	75 - 105	85 - 120	8 - 20	15 - 20	45	-	9.7	B88 - 101		
		AT	TF00		0.030 to 3.0	0.304	19	125 - 155	150 - 190	4 - 10	25 - 30	75	-	9.7	C32 - 39		
					3.1 to 14.0	0.304	19	125 - 155	150 - 190	3 - 10	25 - 30	75	-	9.7	C32 - 39		
	HT	TH04	0.030 to 0.375	0.304	19	145 - 185	170 - 210	2 - 5	25 - 30	75	-	9.7	C35 - 41				
			0.376 to 1.0	0.304	19	145 - 185	170 - 210	2 - 5	25 - 30	75	-	9.7	C35 - 41				
3 (C17510) & 10,10X (C17500)	A	TB00	As Drawn or As Extruded	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		
				0.030 to 3.0	0.319	20	50 - 75	65 - 80	10 - 15	20 - 30	60	-	9.8	B60 - 80			
	AT	TF00		0.030 to 10.0	0.319	20	80 - 100	100 - 130	10 - 25	45 - 60	145	35 - 45	9.8	B92 - 100			
				2 hours @ 900°F	0.030 to 3.0	0.319	20	95 - 125	110 - 140	5 - 25	48 - 60	145	-	9.8		B95 - 102	
310	AT	TF00	-	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			
			0.87 to 8.0	0.318	19.6	96 - 107	104 - 119	10 - 14	45	135	-	9.8	B98 min.				
Copper Nickel Tin	ToughMet® 2 (C96970)	CX	-	-	2.0 to 12.0	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	
					1.5 to 3.0	0.325	21	90 min.	105 min.	6 min.	7 - 8	22	-	9.1	C27 min.		
	ToughMet® 3 (C96900)	CX90	-	-	1.5 to 3.0	0.325	21	105 min.	110 min.	4 min.	7 - 8	22	35 - 45	9.1	C30 min.	76-78%Cu, 14.5-15.5%Ni, 7.5-8.5% Sn	
					1.0 to 3.9	0.325	21	90 min.	110 min.	15 min.	7 - 8	22	-	9.1	C22 min.		
	ToughMet® 3 (C72900)	AT90	TX00	-	4.0 to 8.0	0.325	21	90 min.	110 min.	12 min.	7 - 8	22	-	9.1	C22 min.		
					0.595 to 3.9	0.325	21	110 min.	125 min.	10 min.	7 - 8	22	40 - 60	9.1	C30 min.		
		4.0 to 8.0	0.325		21	110 min.	125 min.	6 min.	7 - 8	22	40 - 60	9.1	C30 min.				
		8.1 to 13.0	0.325		21	110 min.	128 min.	5 min.	7 - 8	22	50 typ.	8.9	C30 min.				
TS105	TSXX	-	1.5 to 3.05	0.325	21	105 min.	120 min.	15 min.†	< 7	22	-	8.9	C22 min.				
TS150	TSXX	-	1.3 to 3.00‡	0.325	21	150 min.	158 min.	5 min.	< 7	22	-	8.9	C 36 min.				
Other Alloys	C95510 (C95510)	-	TQ50	-	2.0 - 3.9	0.272	16	62.5 min.	105 min.	9 min.	7	24.0	-	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	24.0	-	9.0	-		
	C95520	-	-	-	OD < 16.0 and Wall < 2	0.270		90 min.	125 min.	2 min.	8	24.0	-	9.0	-	74.5 Cu (min.), 10.5-11.5%Al, 4.2-6.0% Ni, 4.0-5.5% Fe	
C18000	AT	TF00	-	-	1.0 to 14	0.320	18.5	70.0	90.0	14.0	45 min.	120.0	-	9.7	B90 min.	95.4-97.7%Cu, 1.8-3.0%Ni, 0.4-0.8%Si, 0.1-0.8%Cr	
					0.625 to 1.0	0.320	18.5	75.0	95.0	14.0	45 min.	120.0	-	9.7	B92 min.		

\* Tube is produced with wall thicknesses equal to approximately 10% to 20% of the outside diameter (see ‡ for exceptions) .

\*\* DSTO tempers have an average CVN value of 11 ft-lbs, with no test value less than 10 ft-lbs.

† TS105 tube with >0.4" wall thickness has a minimum elongation of 16% and an average CVN impact strength of 14 ft-lbs

‡ Wall thickness 8-20% of OD for OD < 2"; 6-10% for OD ≥ 2".



## Properties of Materion 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
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		
		AT	TF00	3 hours @ 625°F	Over 2.0 to 3.0	0.300	19	75 - 105	85 - 120	8 - 20	25 - 30	45	9.7	B88 - 102		
		HT	TH04	2 hours @ 625°F	.50 to 8.0	0.302	19	140 - 175	165 - 200	3 - 10	25 - 30	75	9.7	C36 - 41		
	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			
	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
					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		
		AT	TF00	3 hours @ 625°F	Over 2.0 to 3.0	0.300	19	75 - 105	85 - 120	8 - 20	15 - 20	45	9.7	B88 - 101		
		HT	TH04	2 hours @ 625°F	0.50 to 8.0	0.304	19	130 - 155	150 - 190	3 - 10	25 - 30	75	9.7	C33 - 39		
	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			
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	TX00	-	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	