



# Specification Sheet

Last Modified: May 13, 2017

## C17200

Beryllium Copper

### Chemical Composition

(%max., unless shown as range or min.)

	Cu(1)	Al	Be	Co(2)	Si
<b>Min./Max.</b>	Rem.	0.2	1.80-2.00	.20 min	0.2
<b>Nominal</b>	98.1	-	1.9	-	-

(1) Cu value includes Ag.

(2) Ni + Co, .20% min.: Ni + Fe + Co, .6% max

Note: Cu + Sum of Named Elements, 99.9% min.

### Applicable Specifications

Product	Specification
Bar	AMS 4650, 4651, 4533 ASTM B194, B196 MILITARY MIL-C-21657 SAE J463, J461
Extrusions	ASTM B570
Forgings	AMS 4650 ASTM B570
Plate	ASTM B194
Rod	AMS 4650, 4534, 4533, 4651 ASTM B196 MILITARY MIL-C-21657 SAE J463, J461
Rod, Forging	AMS 4650
Sheet	ASTM B194
Strip	ASTM B194 SAE J463, J461
Tube, Seamless	AMS 4535 ASTM B643
Wire	AMS 4725 ASTM B197 SAE J463, J461

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## Common Fabrication Processes

Blanking, Drawing, Drilling, Forming and Bending, Tapping, Turning

## Fabrication Properties

Joining Technique	Suitability
Soldering	Good
Brazing	Good
Oxyacetylene Welding	Not Recommended
Gas Shielded Arc Welding	Good
Coated Metal Arc Welding	Good
Spot Weld	Good
Seam Weld	Fair
Butt Weld	Fair
Capacity for Being Cold Worked	Good
Capacity for Being Hot Formed	Excellent
Forgeability Rating	40
Machinability Rating	2

## Thermal Properties

Treatment	Temp./Time – US	Temp./Time – SI
Stress Temperature	400	205
Solution Minimum	1425	775
Solution Maximum	1475	802
Solution Time	0.5	
Solution Medium	Water	
Precipitation Value	600	316
Precipitation Time	3	
Precipitation Medium	Water	
Annealing Minimum		
Annealing Maximum		
Annealing Time		
Hot Works Minimum	1200	649
Hot Works Maximum	1500	816



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## Mechanical Properties (Measured at Room Temperature, 68°F (20°C))

Temper	Section Size	Cold Work	Typ/Min	Temp	Tensile Strength		Yield Strength (0.5% ext. under load)		Yield Strength (0.05% offset)		EI	Rockwell Hardness				Vickers Hardness	Brinell Hardness			Shear Strength	Fatigue Strength	Izod Impact Strength
					F	ksi	ksi	ksi	ksi	%		B	C	F	30T		500	500	3000			
	in.	%		F	ksi	ksi	ksi	ksi	ksi	%												
	mm.			C	MPa	MPa	MPa	MPa	MPa													J
<b>Flat Products</b>																						
TM05	0	0	MIN	68	150	-	125	-	9	-	31	-	-	-	-	-	-	-	-	-	-	0
	0			20	1030	-	860	-	9	-	31	-	-	-	-	-	-	-	-	-	-	0
TM08	0.188	0	TYP	68	182	-	160	-	6	-	-	-	-	-	-	-	-	-	-	-	-	0
	4.78			20	1255	-	1103	-	6	-	-	-	-	-	-	-	-	-	-	-	-	0
TD02	0.188	0	TYP	68	92	-	82	-	15	92	-	-	77	-	-	-	-	-	-	-	-	0
	4.78			20	634	-	565	-	15	92	-	-	77	-	-	-	-	-	-	-	-	0
<b>Rod</b>																						
TH04	3	0	TYP	68	195	-	145	-	4	-	41	-	-	-	-	-	-	-	-	-	-	0
	76.2			20	1344	-	1000	-	4	-	41	-	-	-	-	-	-	-	-	-	-	0
<b>Wire</b>																						
TF00	0	0	TYP	68	178	-	160	-	3	-	-	-	-	-	-	-	-	-	-	-	-	0
	0			20	1227	-	1103	-	3	-	-	-	-	-	-	-	-	-	-	-	-	0
<b>Flat Products</b>																						
TF00	0.188	0	TYP	68	175	-	155	-	6	-	38	-	-	-	-	-	-	-	-	-	36	0
	4.78			20	1207	-	1069	-	6	-	38	-	-	-	-	-	-	-	-	-	248	0
TM06	0.188	0	TYP	68	168	-	148	-	7	-	37	-	-	-	-	-	-	-	-	-	-	0
	4.78			20	1158	-	1020	-	7	-	37	-	-	-	-	-	-	-	-	-	-	0
<b>Rod</b>																						
TD04	1	0	TYP	68	108	-	75	-	8	95	-	-	-	-	-	-	-	-	-	-	-	0
	25.4			20	745	-	517	-	8	95	-	-	-	-	-	-	-	-	-	-	-	0
TF00	0	0	TYP	68	182	-	145	-	4	-	39	-	-	-	-	-	-	-	-	-	-	0
	0			20	1255	-	1000	-	4	-	39	-	-	-	-	-	-	-	-	-	-	0
<b>Wire</b>																						
TD04	0	0	TYP	68	152	-	125	-	1	-	-	-	-	-	-	-	-	-	-	-	-	0
	0			20	1048	-	862	-	1	-	-	-	-	-	-	-	-	-	-	-	-	0
TD02	0	0	TYP	68	122	-	100	-	5	-	-	-	-	-	-	-	-	-	-	-	-	0
	0			20	841	-	689	-	5	-	-	-	-	-	-	-	-	-	-	-	-	0
TH03	0	0	TYP	68	210	-	190	-	1	-	-	-	-	-	-	-	-	-	-	-	-	0
	0			20	1448	-	1310	-	1	-	-	-	-	-	-	-	-	-	-	-	-	0
<b>Flat Products</b>																						
TH04	0.188	0	TYP	68	200	-	180	-	2	-	42	-	-	-	-	-	-	-	-	-	45	0
	4.78			20	1379	-	1241	-	2	-	42	-	-	-	-	-	-	-	-	-	307	0
<b>Rod</b>																						
TD04	0.375	0	TYP	68	110	-	75	-	8	95	-	-	-	-	-	-	-	-	-	-	-	0
	9.53			20	758	-	517	-	8	95	-	-	-	-	-	-	-	-	-	-	-	0
<b>Wire</b>																						
TH04	0	0	TYP	68	212	-	195	-	1	-	-	-	-	-	-	-	-	-	-	-	-	0
	0			20	1462	-	1344	-	1	-	-	-	-	-	-	-	-	-	-	-	-	0
TH02	0	0	TYP	68	200	-	185	-	1	-	-	-	-	-	-	-	-	-	-	-	-	0
	0			20	1379	-	1276	-	1	-	-	-	-	-	-	-	-	-	-	-	-	0
<b>Flat Products</b>																						
TM04	0.188	0	TYP	68	142	-	122	-	12	-	32	-	-	-	-	-	-	-	-	-	-	0
	4.78			20	979	-	841	-	12	-	32	-	-	-	-	-	-	-	-	-	-	0
TM01	0.188	0	TYP	68	115	-	92	-	17	-	23	-	-	-	-	-	-	-	-	-	-	0
	4.78			20	793	-	634	-	17	-	23	-	-	-	-	-	-	-	-	-	-	0
TD04	0.188	0	TYP	68	110	-	104	-	5	99	-	-	81	-	-	-	-	-	-	-	-	0
	4.78			20	758	-	717	-	5	99	-	-	81	-	-	-	-	-	-	-	-	0
TH01	0.188	0	TYP	68	185	-	165	-	4	-	40	-	-	-	-	-	-	-	-	-	40	0
	4.78			20	1276	-	1138	-	4	-	40	-	-	-	-	-	-	-	-	-	276	0
TD01	0.188	0	TYP	68	80	-	70	-	25	80	-	-	70	-	-	-	-	-	-	-	-	0
	4.78			20	552	-	483	-	25	80	-	-	70	-	-	-	-	-	-	-	-	0

\*Fatigue Strength: 100 x 10<sup>6</sup> cycles, unless indicated as [N]X 10<sup>6</sup>.



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## Mechanical Properties (cont'd)

Temper	Section Size	Cold Work	Typ/Min	Temp	Tensile Strength	Yield Strength (0.5% ext. under load)	Yield Strength (0.2% offset)	Yield Strength (0.05% offset)	EI	Rockwell Hardness				Vickers Hardness	Brinell Hardness			Shear Strength	Fatigue Strength	Izod Impact Strength
										B	C	F	30T		500	500	3000			
	in.	%		F	ksi	ksi	ksi	ksi	%	B	C	F	30T	500	500	3000	ksi	ksi	ft-lb	
	mm.			C	MPa	MPa	MPa	MPa									MPa	MPa	J	
<b>Rod</b>																				
TB00	0	0	TYP	68	72	-	20	-	20	65	-	-	-	-	-	-	-	-	0	
	0			20	496	-	138	-	20	65	-	-	-	-	-	-	-	-	0	
TD04	3	0	TYP	68	103	-	75	-	8	94	-	-	-	-	-	-	-	-	0	
	76.2			20	710	-	517	-	8	94	-	-	-	-	-	-	-	-	0	
<b>Wire</b>																				
TB00	0	0	TYP	68	68	-	28	-	35	-	-	-	-	-	-	-	-	-	0	
	0			20	469	-	193	-	35	-	-	-	-	-	-	-	-	-	0	
TD03	0	0	TYP	68	142	-	120	-	2	-	-	-	-	-	-	-	-	-	0	
	0			20	979	-	827	-	2	-	-	-	-	-	-	-	-	-	0	
TH01	0	0	TYP	68	190	-	175	-	2	-	-	-	-	-	-	-	-	-	0	
	0			20	1310	-	1207	-	2	-	-	-	-	-	-	-	-	-	0	
TD01	0	0	TYP	68	102	-	82	-	10	-	-	-	-	-	-	-	-	-	0	
	0			20	703	-	565	-	10	-	-	-	-	-	-	-	-	-	0	
<b>Flat Products</b>																				
TM02	0.188	0	TYP	68	128	-	105	-	15	-	27	-	-	-	-	-	-	-	0	
	4.78			20	883	-	724	-	15	-	27	-	-	-	-	-	-	-	0	
<b>Rod</b>																				
TF00	3	0	TYP	68	182	-	130	-	3	-	39	-	-	-	-	-	-	-	0	
	76.2			20	1255	-	896	-	3	-	39	-	-	-	-	-	-	-	0	
TH04	0.375	0	TYP	68	405	-	315	-	4	-	83	-	-	-	-	-	-	-	0	
	9.53			20	2792	-	2172	-	4	-	83	-	-	-	-	-	-	-	0	
<b>Flat Products</b>																				
TM00	0.188	0	TYP	68	105	-	82	-	20	-	27	-	-	-	-	-	-	-	0	
	4.78			20	724	-	565	-	20	-	27	-	-	-	-	-	-	-	0	
TB00	0	0	TYP	68	70	-	32	-	45	60	-	-	58	-	-	-	-	-	0	
	0			20	483	-	221	-	45	60	-	-	58	-	-	-	-	-	0	
TH02	0.188	0	TYP	68	195	-	175	-	3	-	41	-	-	-	-	-	-	44	0	
	4.78			20	1344	-	1207	-	3	-	41	-	-	-	-	-	-	303	0	

\*Fatigue Strength:  $100 \times 10^6$  cycles, unless indicated as [N]X  $10^6$ .

## Physical Properties

Property	US Customary	Metric
Melting Point - Liquidus	1800 F	982 C
Melting Point - Solidus	1590 F	866 C
Density	.290 lb/in <sup>3</sup> at 68 F	8.25 gm/cm <sup>3</sup> @ 20 C
Specific Gravity	8.26	8.26
Electrical Resistivity	46.20 ohms-cmil/ft @ 68 F	7.68 microhm-cm @ 20 C
Electrical Conductivity*	22 %IACS @ 68 F	0.12 MegaSiemens/cm @ 20 C
Thermal Conductivity**	62 Btu · ft/(hr · ft <sup>2</sup> ·°F) at 68F	107.3 W/m · °K at 20 C
Coefficient of Thermal Expansion	$9.90 \cdot 10^{-6}$ per °F (68-572 F)	$17.8 \cdot 10^{-6}$ per °C (20-300 C)
Specific Heat Capacity	0.10 Btu/lb/°F at 68 F	419.0 J/kg · °K at 293 K
Modulus of Elasticity in Tension	18500 ksi	128000 MPa
Modulus of Rigidity	7300 ksi	50330 MPa

\*In the precipitation hardened condition.

\*\*Actual value is 62-75.



## Tempers Most Commonly Used

Flat Products	
BAR, DRAWN	H02, O60
BAR, ROLLED	H02, O60
PLATE	O60
STRIP, ROLLED	H01, H02, H03, H04, H10, O60

Other	
ROD	H04, O60
SHAPES	O60
TUBE	H58, O60
WIRE	H01, H02, H03, H04, O60

## Typical Uses

### Electrical

Spring Connectors, Current Carrying, Fuse Clips, Belleville Washers, Electrical Switch and Relay Blades, Navigational Instruments, Clips, Contact Bridges, Connectors, Relay Parts, Switch Parts

### Fasteners

Fasteners, Washers, Screws, Bolts, Roll Pins, Retaining Rings, Lock Washers

### Industrial

Housings for Instruments, Springs, Non Sparking Safety Tools, Shafts, Pumps, Springs, Electrochemical, Bushings, Valve Seats, Valve Stems, Flexible Metal Hose, Bourdon Tubes, Wear Plates on Heavy Equipment, Bellows, Diaphragms, Welding Equipment, Rolling Mill Parts, Bearings, Valves, Pump Parts, Spline Shafts

### Ordnance

Firing Pins

### Other

Tools

## Casting Characteristics

No casting characteristics for this alloy.