Specification Sheet

Last Modified: May 13, 2017

C10100

Oxygen-Free-Electronic

Chemical Composition

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

	Cu[(1)]	Sb	As	O	P	Te
Min./Max.	99.99 min	0.0004	0.0005	0.0005	0.0003	0.0002
Nominal	–	–	–	–	–	

(1) Cu is determined by the difference between the impurity total and 100%. The Cu value is exclusive of Ag.

Note: This is a high conductivity copper which has, in the annealed condition a minimum conductivity of 100% IACS except for Alloy C10100 which has a minimum conductivity of 101% IACS.

Note: The following additional impurity maximum limits shall apply: Bi, 1ppm (.0001%); Cd, 1ppm (.0001%); Fe, 10ppm (.0010%); Pb, 5ppm (.0005%); Mn, 0.5ppm (.00005%); Ni, 10ppm (.0010%); Se, 3ppm (.0003%); Ag, 25ppm(.0025%); S, 15ppm (.0015%); Sn, 2ppm (.0002%); Zn, 1ppm (.0001%)

Applicable Specifications

Product	Specification
Bar	ASTM F68, B152
Bar, Bus	ASTM B187
Foil, Printed Circuits	ASTM F68, B451
Pipe, Bus	ASTM B188
Plate	ASTM B152, F68
Plate, Clad	ASTM B432

Millard Wire & Specialty Strip Co.

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Applicable Specifications (cont'd)

Product	Specification
Rod	ASTM F68
Rod, Bus	ASTM B187
Shapes	ASTM F68
Shapes, Bus	ASTM B187
Sheet	ASTM F68, B152
Sheet, Printed Circuits	ASTM F68, B451
Strip	ASTM B152, B272, F68
Strip, Printed Circuits	ASTM F68, B451
Tube	ASTM B640
Tube, Bus	ASTM B188
Tube, Finned	ASTM B359
Tube, Rectangular Waveguide	ASTM F68 MILITARY MIL-W-85
Tube, Seamless	ASTM F68, B641, B75
Tube, Welded	ASTM B641, B447
Wire	AMS 4700 ASTM B3, B272, B2, B48, F68, F68, B1, F68 FEDERAL QQ-W-343
Wire, Coated With Lead Alloy	ASTM B189
Wire, Coated With Nickel	ASTM B355
Wire, Coated With Silver	ASTM B298
Wire, Coated With Tin	ASTM B33, B246
Wire, Stranded	ASTM B173, B172, B226, B174, B286, B496, B470, B8 FEDERAL QQ-B-575

Common Fabrication Processes

Blanking, Coining, Coppersmithing, Drawing, Etching, Forming and Bending, Heading and Upsetting, Hot Forging and Pressing, Piercing and Punching, Roll Threading and Knurling, Shearing, Spinning, Squeezing and Swaging, Stamping

Fabrication Properties

Joining Technique	Suitability
Soldering	Excellent
Brazing	Excellent
Oxyacetylene Welding	Fair
Gas Shielded Arc Welding	Good
Coated Metal Arc Welding	Not Recommended
Spot Weld	Not Recommended
Seam Weld	Not Recommended
Butt Weld	Good
Capacity for Being Cold Worked	Excellent
Capacity for Being Hot Formed	Excellent
Forgeability Rating	65
Machinability Rating	20

Thermal Properties

Treatment	Temp./Time – US	Temp./Time – SI
Stress Temperature		
Solution Minimum		
Solution Maximum		
Solution Time		
Solution Medium	None	
Precipitation Value		
Precipitation Time		
Precipitation Medium	None	
Annealing Minimum	700	371
Annealing Maximum	1200	649
Annealing Time		
Hot Works Minimum	1400	761
Hot Works Maximum	1600	872

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 (0.2% offset)	Yield Strength (0.05% offset)	El	Rockwell Hardness				Vickens Hardness	Brinell Hardness		Shear Strength	Fatigue Strength	Izod Impact Strength
	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
Tube																			
H80	0.065	0	TYP	68	55	50	-	-	8	60	-	95	63	-	-	-	29	-	0
	1.65			20	379	345	-	-	8	60	-	95	63	-	-	-	200	-	0
Flat Products																			
M20	0.25	0	TYP	68	32	10	-	-	50	-	-	40	-	-	-	-	22	-	0
	6.35			20	221	69	-	-	50	-	-	40	-	-	-	-	152	-	0
H04	0.25	0	TYP	68	50	45	-	-	12	50	-	90	-	-	-	-	28	-	0
	6.35			20	345	310	-	-	12	50	-	90	-	-	-	-	193	-	0
H02	0.04	0	TYP	68	42	36	-	-	14	40	-	84	50	-	-	-	26	13	0
	1			20	290	248	-	-	14	40	-	84	50	-	-	-	179	90	0
Rod																			
M20	1	0	TYP	68	32	10	-	-	55	-	-	40	-	-	-	-	22	-	0
	25.4			20	221	69	-	-	55	-	-	40	-	-	-	-	152	-	0
Flat Products																			
H04	0.04	0	TYP	68	50	45	-	-	6	50	-	90	57	-	-	-	28	13	0
	1			20	345	310	-	-	6	50	-	90	57	-	-	-	193	90	0
Rod																			
H04	0.25	40	TYP	68	55	50	-	-	10	60	-	94	-	-	-	-	29	-	0
	6.35			20	379	345	-	-	10	60	-	94	-	-	-	-	200	-	0
Wire																			
OS050	0.08	0	TYP	68	35	-	-	-	35	-	-	-	-	-	-	-	24	-	0
	2			20	241	-	-	-	35	-	-	-	-	-	-	-	165	-	0
Flat Products																			
H01	0.25	0	TYP	68	30	30	-	-	35	25	-	70	-	-	-	-	25	-	0
	6.35			20	262	207	-	-	35	25	-	70	-	-	-	-	172	-	0
H08	0.04	0	TYP	68	55	50	-	-	4	60	-	94	63	-	-	-	29	14	0
	1			20	379	345	-	-	4	60	-	94	63	-	-	-	200	97	0
Rod																			
OS050	1	0	TYP	68	32	10	-	-	55	-	-	40	-	-	-	-	22	-	0
	25.4			20	221	69	-	-	55	-	-	40	-	-	-	-	152	-	0
Wire																			
H08	0.08	0	TYP	68	66	-	-	-	1	-	-	-	-	-	-	-	33	-	0
	2			20	455	-	-	-	1	-	-	-	-	-	-	-	228	-	0
Flat Products																			
H04	1	0	TYP	68	45	40	-	-	20	45	-	85	-	-	-	-	26	-	0
	25.4			20	310	276	-	-	20	45	-	85	-	-	-	-	179	-	0
OS050	0.25	0	TYP	68	32	10	-	-	50	-	-	40	-	-	-	-	22	-	0
	6.35			20	221	69	-	-	50	-	-	40	-	-	-	-	152	-	0
H00	0.25	0	TYP	68	36	28	-	-	40	10	-	60	-	-	-	-	25	-	0
	6.35			20	248	193	-	-	40	10	-	60	-	-	-	-	172	-	0
Rod																			
H04	2	16	TYP	68	45	40	-	-	20	45	-	85	-	-	-	-	26	-	0
	51			20	310	276	-	-	20	45	-	85	-	-	-	-	179	-	0
H04	1	35	TYP	68	48	44	-	-	16	47	-	87	-	-	-	-	27	17	0
	25.4			20	331	303	-	-	16	47	-	87	-	-	-	-	186	117	0
Shapes																			
M20	0.5	0	typ	68	32	10	-	-	50	-	-	45	-	-	-	-	22	-	0
	12.7			20	220	69	-	-	50	-	-	45	-	-	-	-	150	-	0
Tube																			
H55	0.065	0	TYP	68	40	32	-	-	25	35	-	77	45	-	-	-	26	-	0
	1.65			20	276	221	-	-	25	35	-	77	45	-	-	-	179	-	0
OS025	0.065	0	TYP	68	34	11	-	-	45	-	-	45	-	-	-	-	23	-	0
	1.65			20	234	76	-	-	45	-	-	45	-	-	-	-	159	-	0
Flat Products																			
M20	0.04	0	TYP	68	34	10	-	-	45	-	-	45	-	-	-	-	23	-	0
	1			20	234	69	-	-	45	-	-	45	-	-	-	-	159	-	0

Mechanical Properties (cont'd)

(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 (0.2% offset)	Yield Strength (0.05% offset)	El	Rockwell Hardness				Vickens Hardness	Brinell Hardness		Shear Strength	Fatigue Strength	Izod Impact Strength
	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
Shapes																			
M30	0.5	0	typ	68	32	10	-	-	50	-	-	45	-	-	-	-	22	-	0
	12.7			20	220	69	-	-	50	-	-	45	-	-	-	-	150	-	0
Wire																			
H04	0.08	0	TYP	68	55	-	-	-	1	-	-	-	-	-	-	-	29	-	0
	2			20	379	-	-	-	1	-	-	-	-	-	-	-	200	-	0
Flat Products																			
OS050	0.04	0	TYP	68	32	10	-	-	45	-	-	40	-	-	-	-	22	-	0
	1			20	221	69	-	-	45	-	-	40	-	-	-	-	152	-	0
Shapes																			
OS050	0.5	0	typ	68	32	10	-	-	50	-	-	45	-	-	-	-	22	-	0
	12.7			20	220	69	-	-	50	-	-	45	-	-	-	-	150	-	0
H04	0.5	15	TYP	68	40	32	-	-	30	35	-	-	-	-	-	-	26	-	0
	12.7			20	276	221	-	-	30	35	-	-	-	-	-	-	179	-	0
Tube																			
OS050	0.065	0	TYP	68	32	10	-	-	45	-	-	40	-	-	-	-	22	-	0
	1.65			20	221	69	-	-	45	-	-	40	-	-	-	-	152	-	0
Flat Products																			
OS025	0.04	0	TYP	68	34	11	-	-	45	-	-	45	-	-	-	-	23	11	0
	1			20	234	76	-	-	45	-	-	45	-	-	-	-	159	76	0
H01	0.04	0	TYP	68	38	30	-	-	25	25	-	70	36	-	-	-	25	-	0
	1			20	262	207	-	-	25	25	-	70	36	-	-	-	172	-	0
H00	0.04	0	TYP	68	36	28	-	-	30	10	-	60	25	-	-	-	25	-	0
	1			20	248	193	-	-	30	10	-	60	25	-	-	-	172	-	0
H10	0.04	0	TYP	68	57	53	-	-	4	62	-	95	64	-	-	-	29	-	0
	1			20	393	365	-	-	4	62	-	95	64	-	-	-	200	-	0

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

Physical Properties

Property		
US Customary	Metric	
Melting Point - Liquidus	1981° F	1083° C
Melting Point - Solidus	1981° F	1083° C
Density	0.323 lb/in3 at 68 F	8.94 gm/cm3 @ 20 C
Specific Gravity	8.94	8.94
Electrical Resistivity	10.30 ohms-cmil/ft @ 68 F	1.71 microhm-cm @ 20 C
Electrical Conductivity*	101 %IACS @ 68 F	0.591 MegaSiemens/cm @ 20° C
Thermal Conductivity	226 Btu·ft/(hr·ft2·°F)at 68F	391.1 W/m·°K at 20 C
Coefficient of Thermal Expansion	$9.40 \cdot 10^{-6}$ per °F (68-212 F)	$16.9 \cdot 10^{-6}$ per °C (20-100° C)
Coefficient of Thermal Expansion	$9.60 \cdot 10^{-6}$ per °F (68-392 F)	$17.3 \cdot 10^{-6}$ per °C (20-200° C)
Coefficient of Thermal Expansion	$9.80 \cdot 10^{-6}$ per °F (68-572 F)	$17.6 \cdot 10^{-6}$ per °C (20-300° C)
Specific Heat Capacity	0.092 Btu/lb/°F at 68 F	393.5 J/kg·°K at 293 K
Modulas of Elasticity in Tension	17000 ksi	117000 MPa
Modulus of Rigidity	6400 ksi	44130 MPa

Tempers Most Commonly Used

Flat Products	
BAR, DRAWN	H01, H04, H06, O60
BAR, ROLLED	H01, H04, H06, M20, O60
PLATE	H00, M20
SHEET	H00, H02, M20, O60
STRIP, DRAWN	H04, O60
STRIP, ROLLED	H00, H01, H02, H04, H08, H10, M20, O60, OS025, OS050
WIRE, DRAWN	H04, H06, O60
WIRE, ROLLED	H04, O60

Other	
PIPE	H58
ROD	H04, H08, M20, M30, O60, OS050
SHAPES	H04, M20, M30, O60, OS050
TUBE	H55, H58, H80, O60, OS025, OS050
WIRE	H00, H01, H04, H08, O60, OS050

Typical Uses

Automotive

Automotive Rectifiers

Electrical

Transistor Component Bases, High Resistance-Ratio Cryogenic Shunts, Bus Conductors, Wave Guides, Hollow Conductors, Anodes for Vacuum Tubes, Coaxial Cable, Coaxial Tube, Klystrons, Microwave Tubes, Bus Bars, Lead-in Wire, Vacuum Seals, Conductors, Glass-to-Metal Seals

Casting Characteristics

No casting characteristics available for this alloy.