



C12200

Phosphorus-Deoxidized, High Residual P

Chemical Composition

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

	Cu	P
Min./Max.	99.9 min	.015-.040
Nominal	-	0.02

Note: This includes oxygen-free Cu which contains P in an amount agreed upon.

Applicable Specifications

Product	Specification
Bands, Projectile Rotating	MILITARY MIL-B-18907, MIL-B-20292
Bar	ASME SB152, SB133 ASTM B187, B152 SAE J463, J461
Brazing Filler Metal	FEDERAL QQ-B-650
Fittings	ASME B16.29, B16.22
Nipples	ASTM B687
Pipe	ASME SB42 ASTM B42, B698
Pipe, Threadless (Seamless)	ASTM B302
Plate	ASME SB152 ASTM B152
Plate, Clad	ASTM B432
Rod	ASME SB133 SAE J461, J463
Shapes	ASTM B187 SAE J461, J463

Millard Wire & Specialty Strip Co.

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Applicable Specifications (cont'd)

Product	Specification
Sheet	ASME SB152
	ASTM B152
	SAE J463, J461
Sheet, Building Construction	ASTM B370
Sheet, Clad	ASTM B506
Sheet, Lead Coated	ASTM B101
Strip	ASME SB152
	ASTM B152, B272
	SAE J463, J461
Strip, Building Construction	ASTM B370
Strip, Clad	ASTM B506
Tube	ASTM B698, B903
Tube, Capillary	ASTM B360
Tube, Coils	ASTM B743
Tube, Condenser	ASME SB111
	ASTM B111
Tube, Drainage (DWV)	ASTM B306
Tube, Finned	ASME SB359
	ASTM B359
	MILITARY MIL-T-22214
Tube, Seamless	ASME SB75
	ASTM B75, B641
	MILITARY MIL-T-24107
	SAE J461, J463
Tube, Seamless (Water)	ASTM B88
Tube, Seamless Bright Annealed	ASTM B68
Tube, Seamless for Air Conditioning and Refrigeration Field Service	ASTM B280 SAE J461, J463
Tube, Seamless for Torpedo Use	MILITARY MIL-T-3235
Tube, U-Bend	ASME SB395
	ASTM B395
Tube, Welded	ASME SB543
	ASTM B641, B447, B716, B543
Tube, Welded for Air Conditioning and Refrigeration Service	ASTM B640
Wire, Flat	ASTM B272



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	Good
Gas Shielded Arc Welding	Excellent
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		
Annealing Maximum		
Annealing Time		
Hot Works Minimum		
Hot Works Maximum		



C12200 Specification Sheet

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)	EI	Rockwell Hardness				Vickers Hardness	Brinell Hardness			Shear Strength	Fatigue Strength	Izod Impact Strength
					F ksi C MPa	ksi MPa	ksi MPa	ksi MPa		%	B	C	F	30T	500	500	3000	ksi MPa	ksi MPa	ft-lb J
Pipe																				
H04	0	30	TYP	68	50	45	-	-	10	50	-	90	-	-	-	-	28	-	0	
	0			20	345	310	-	-	10	50	-	90	-	-	-	-	193	-	0	
Flat Products																				
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	
H04	0.25	0	TYP	68	50	45	-	-	12	50	-	90	-	-	-	-	28	-	0	
	6.35			20	345	310	-	-	12	50	-	90	-	-	-	-	193	-	0	
M20	0.25	0	TYP	68	32	10	-	-	50	-	-	40	-	-	-	-	22	-	0	
	6.35			20	221	69	-	-	50	-	-	40	-	-	-	-	152	-	0	
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	
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	
H01	0.25	0	TYP	68	38	30	-	-	35	25	-	70	-	-	-	-	25	-	0	
	6.35			20	262	207	-	-	35	25	-	70	-	-	-	-	172	-	0	
H04	1	0	TYP	68	45	40	-	-	20	45	-	85	-	-	-	-	26	-	0	
	25.4			20	310	276	-	-	20	45	-	85	-	-	-	-	179	-	0	
H00	0.25	0	TYP	68	36	28	-	-	40	10	-	60	-	-	-	-	25	-	0	
	6.35			20	248	193	-	-	40	10	-	60	-	-	-	-	172	-	0	
OS050	0.25	0	TYP	68	32	10	-	-	50	-	-	40	-	-	-	-	22	-	0	
	6.35			20	221	69	-	-	50	-	-	40	-	-	-	-	152	-	0	
Tube																				
OS025	0.065	0	TYP	68	34	11	-	-	45	-	-	45	-	-	-	-	23	-	0	
	1.65			20	234	76	-	-	45	-	-	45	-	-	-	-	159	-	0	
H80	0.065	40	TYP	68	55	50	-	-	8	60	-	95	63	-	-	-	29	19	0	
	1.65			20	379	345	-	-	8	60	-	95	63	-	-	-	200	131	0	
H55	0.065	15	TYP	68	40	32	-	-	25	35	-	77	45	-	-	-	26	14	0	
	1.65			20	276	221	-	-	25	35	-	77	45	-	-	-	179	97	0	
Flat Products																				
M20	0.04	0	TYP	68	34	10	-	-	45	-	-	45	-	-	-	-	23	-	0	
	1			20	234	69	-	-	45	-	-	45	-	-	-	-	159	-	0	
OS050	0.04	0	TYP	68	32	10	-	-	45	-	-	40	-	-	-	-	22	-	0	
	1			20	221	69	-	-	45	-	-	40	-	-	-	-	152	-	0	
Tube																				
OS050	0.065	0	TYP	68	32	10	-	-	45	-	-	40	-	-	-	-	22	11	0	
	1.65			20	221	69	-	-	45	-	-	40	-	-	-	-	152	76	0	
Flat Products																				
H01	0.04	0	TYP	68	38	30	-	-	25	25	-	70	36	-	-	-	25	-	0	
	1			20	262	207	-	-	25	25	-	70	36	-	-	-	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	
OS025	0.04	0	TYP	68	34	11	-	-	45	-	-	45	-	-	-	-	23	11	0	
	1			20	234	76	-	-	45	-	-	45	-	-	-	-	159	76	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	

*Fatigue Strength: 100 x 10⁶ cycles, unless indicated as [N]X 10⁶.



Physical Properties

Property	US Customary	Metric
Melting Point - Liquidus	1981° F	1083° C
Density	0.323 lb/in ³ at 68° F	8.94 gm/cm ³ @ 20° C
Specific Gravity	8.94	8.94
Electrical Resistivity	12.20 ohms-cmil/ft @ 68° F	2.03 microhm-cm @ 20° C
Electrical Conductivity	85 %IACS @ 68 F	0.497 MegaSiemens/cm @ 20° C
Thermal Conductivity	196 Btu·ft/(hr·ft ² ·°F) at 68°F	339.2 W/m·°K at 20° C
Coefficient of Thermal Expansion	9.40·10 ⁻⁶ per °F (68-212° F)	16.9·10 ⁻⁶ per °C (20-100° C)
Coefficient of Thermal Expansion	9.50·10 ⁻⁶ per °F (68-392° F)	17.1·10 ⁻⁶ per °C (20-200° C)
Coefficient of Thermal Expansion	9.80·10 ⁻⁶ per °F (68-572° F)	17.6·10 ⁻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
Modulus of Elasticity in Tension	17000 ksi	117000 MPa
Modulus of Rigidity	6400 ksi	44130 MPa

Tempers Most Commonly Used

Flat Products	
PLATE	M20, OS050
SHEET	M20, OS050
STRIP, ROLLED	OS050

Other	
PIPE	H04
ROD	H04, OS050
TUBE	H55, H58, H80, OS025, OS050

Typical Uses

Architecture

Downspouts, Gutters, Flashing, Roofing

Automotive

Air Lines, Oil Lines, Hydraulic Lines

Building

Heater Units, Heater Lines, Gas Lines, Oil Burner Tubes, Air Conditioner Tubes and Condenser Sheets



Typical Uses (cont'd)

Consumer

Air Conditioners, Refrigerators

Electrical

Wire Connectors, Heater Elements

Industrial

Hydraulic Lines in Airplanes, Oil Lines in Airplanes, Gage Lines, Rotating Bands, Kettles, Anodes for Electroplating, Heat Exchanger Shells, Expansion Joint Tubes, Paper Rolls, Print Rolls, Sugar House Refinery Lines, Gasoline Lines in Airplanes, Air Lines in Airplanes, Oil Coolers in Airplanes, Tanks, Water Lines, Steam Lines, Paper Lines, Pulp Lines, Distiller Tubes, Dairy Tubes, Heat Exchanger Tubes, Evaporator Tubes, Condenser Tubes, Brewery Tubes, Casting Molds, Tubing, LP Gas Service, Tubing, Medical Gas- Oxygen, Plating Anodes, Plating Racks, Plating Anodes, Plating Hangers, Plumbing Tube

Marine

Oil Coolers, Gasoline Lines

Plumbing

Oil Coolers, Gasoline Lines

Casting Characteristics

No casting characteristics for this alloy.