ALLOY DATA

C51000
ASTM B103

wieland

The "work horse" of the phosphor bronzes, alloy C510 combines strength, toughness and good ductility with excellent resistance to fatigue. Additional advantages of a high elastic limit, good resistance to corrosion and corrosion-fatigue make this alloy an optimal choice for designers considering active spring applications including: mechanical springs, electrical contact springs, terminals, diaphragms and bellows.

Chemical Composition

Copper[1]	**Remainder**
Tin	**4.2-5.8%**
Phosphorous	**0.03-0.35%**
Lead	0.05% Max
Iron	0.10% Max
Zinc	0.30% Max

[1] Cu + Named Elements, 99.5% min

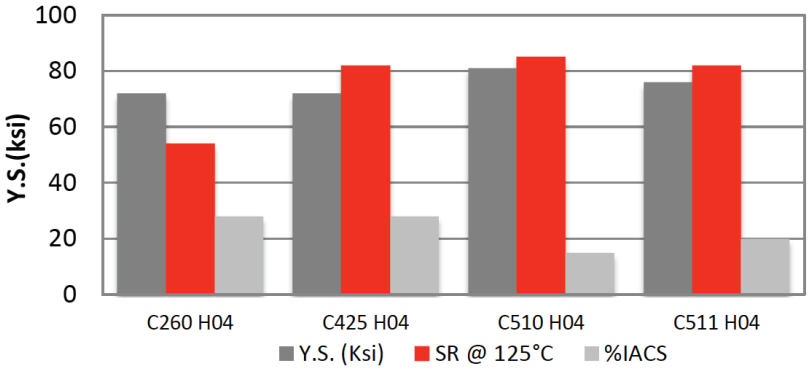

Figure 1: Comparison of Tensile Strength , Electrical Conductivity and Stress Relaxation performance @ 1000hrs of select spring materials.

Physical Properties

	English Units	Metric Units
Density	0.320 lb/in^3 @ 68ºF	8.86 g/cm^3
Thermal Conductivity	40 BTU-ft/ft^2-hr-ºF	69 W/mºK
Electrical Resistivity	69.1 ohm circ mils/ft	11.5 microhm-cm
Electrical Conductivity (annealed)	15% IACS*	0.087 megamho/cm
Modulus of Elasticity	16,000,000 psi	110 kN/mm^2
Thermal Capacity(Specific Heat)	0.090 Btu/lb/Fº @ 68ºF	0.090 cal/gm/Cº @ 20ºC
Coeff. Of Thermal Expansion		
68-572ºF (20-300ºC)	9.90 PPM/ºF	17.82 PPM/ºC

*International Annealed Copper Standard

Mechanical Properties

Temper[1]	Tensile Strength		Yield Strength[2]		% Elongation[2]	Typical 90º Bend Formability GW/BW[3]	
	ksi	N/mm^2	ksi	N/mm^2			
Annealed	46-56	315-385	24	165	55	-	-
1/4 Hard	49-61	340-420	37	255	41	-	-
1/2 Hard	58-73	400-505	57	395	24	-	0.5
3/4 Hard	68-79	470-545	68	470	15	0.5	1.0
Hard	76-91	525-625	81	560	10	1.0	1.5
Extra Hard	88-103	605-710	93	640	4	1.5	2.5
Spring Hard	95-110	655-760	100	690	2	2.0	5.0
Extra Spring	100-114	690-785	104	715	2		

[1] Mechanical properties subject to change. All tempers listed are made to a Tensile Strength specification unless otherwise noted.

[2] Nominal Values [3] DATA FOR REFERENCE ONLY. R/T = Bend Radius/Material Thickness <0.016" (0.4mm) thick, 11/16 (17.5mm) wide. Relief annealed tempers.