

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

| | |
|---------------------------|-------------------|
| Copper¹ | 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

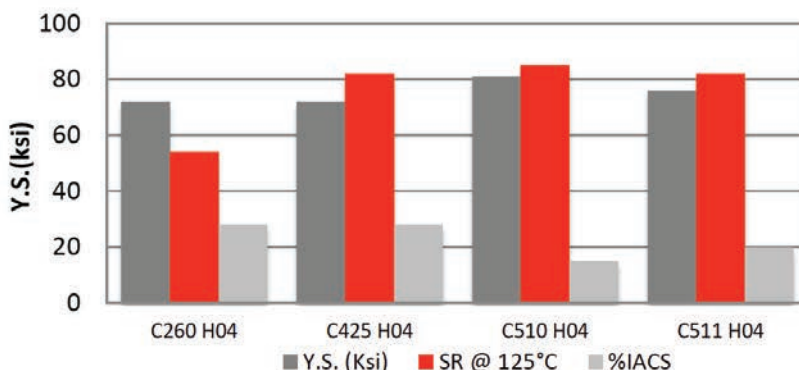


Figure 1: Comparison of Tensile Strength, Electrical Conductivity and Stress Relaxation performance @ 1000hrs of select spring materials.

Physical Properties

| | English Units | Metric Units |
|--|----------------------------------|------------------------|
| Density | 0.320 lb/in ³ @ 68°F | 8.86 g/cm ³ |
| Thermal Conductivity | 40 BTU-ft/ft ² -hr-°F | 69 W/m°K |
| 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/F° @ 68°F | 0.090 cal/gm/C° @ 20°C |
| Coeff. Of Thermal Expansion 68-572°F (20-300°C) | 9.90 PPM/°F | 17.82 PPM/°C |

*International Annealed Copper Standard

Mechanical Properties

| Temper ¹ | Tensile Strength | | Yield Strength ² | | % Elongation ² | Typical 90° 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.