

# HM Wire International, Inc.

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## Alloy 511 - Phosphor Bronze

**Description:** 511 Alloy offers an optimum combinations of engineering properties like: high strength and ductility, excellent spring properties, and good bearing qualities and wear resistance.

**Applications:** Typically used for Switch parts, Resistance wire, Electrical Connectors, Pots, Kettles, Fasteners, Lock Washers, Clutch Disks and Welding Rods.

| Nominal Composition: | Cu%   | Sn%  | P%   |
|----------------------|-------|------|------|
|                      | 95.9% | 4.0% | 0.1% |

### Physical Properties - Age hardened products

|   | English Units                           | Metric Units |
|---|---|--------------|
| Specific Gravity                        | 8.86 g/cu cm                            |              |
| Coefficient of Thermal Expansion per °C | 17.80 x 10 <sup>-6</sup> (20-300°C)     |              |
| Thermal Conductivity                    | 48 Btu/ft <sup>2</sup> /ft.hr/°F @ 68°F |              |
| Modulus of Elasticity - Tension         | 16,000 ksi                              |              |
| Electrical Conductivity at 68 °F        | 20% IACS                                |              |

### Mechanical Properties

| Temper       | Tensile Strength: x Ksi (Kgf/mm <sup>2</sup> - Ksi x 0.7031) | Elongation in 50 mm (2 in.), % | Yield Strength: x Ksi (0.2% offset)(Kgf/mm <sup>2</sup> - Ksi x 0.7031) |
|--------------|--|--------------------------------|---|
| Annealed     | 46-54  | 47                             | 22  |
| 1/4 Hard     | 46-58  | 36                             | 35  |
| 1/2 Hard     | 55-70  | 21                             | 56  |
| 3/4 Hard     | 67-82  | 10                             | 72  |
| Hard         | 72-87  | 7                              | 76  |
| Extra Hard   | 84-99  | 4                              | 88  |
| Spring       | 91-105   | 3                              | 94  |
| Extra Spring | 96-109   | 2 max.                         | 98 min.   |

\*To be used as a guideline only.

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