ALLOY C19010
COPPER-NICKEL-SILICON
Cu-Ni-Si

Exceptional Performance
Versatile Product
Global Availability
When the heat is on, the design problem becomes more complex. In addition to strength, formability and conductivity, stress relaxation is crucial to your design reliability. C19010 has been engineered to meet these design expectations. C19010 offers excellent formability, strength, and 125°C stress relaxation resistance coupled with excellent conductivity and plateability so you won’t have to compromise in design.
Performance When the Heat is On

With each new generation in connector design, increased performance at elevated temperatures requires designers to be more demanding in alloy selection.

As shown in Figure 1, C19010 stands up to the test at 125°C, while maintaining 85% of the initial stress after 3,000 hours (and >79% remaining after 10,000 hours), well above the standard of 70% that many designers require as a minimum.

C19010 provides superior performance over all the competitive alloys. Such stability allows designers to take advantage of the alloy consolidation opportunities even at slightly lower strength.

**Figure 1**
Stress Relaxation Resistance at 125°C
Like most people today, you’re looking for that do-everything tool that lets you go from design to implementation with less worry, little hassle and in less time than your competition.

While it may not open your favorite bottle of wine, C19010 is the versatile alloy you’ve been searching for. With its wide range of capabilities and world-wide availability, C19010 makes designing a finished product easier, purchasing a global alloy friendlier and your life a little bit simpler.

Perhaps you should start looking for that corkscrew.
**Formable**

Bend formability is an important focus as connector designs continue to miniaturize. Unlike many alloys on the market, the increased strength and stress relaxation benefits of C19010 are achieved without sacrificing formability. *(Figure 2)*

C19010 possesses ideal formability for many of your interconnect products. 1.0TGW bends can typically be made at strengths of up to 92 ksi/565 MPa. 0.5TGW bends can be utilized up to 70ksi.

**Figure 2**

*Typical Yield Strength Available at a 1t 90 Degree Goodway Bend*

### Bend Properties

<table>
<thead>
<tr>
<th>Temper</th>
<th>H01</th>
<th>H02</th>
<th>H03</th>
<th>H04</th>
<th>H06</th>
<th>H08</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goodway - (max. R/T) - Spec.</td>
<td>0.5</td>
<td>0.5</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Goodway - Typical</td>
<td>0.0</td>
<td>0.0</td>
<td>0.5</td>
<td>0.8</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Badway (max. R/T) - Spec</td>
<td>0.8</td>
<td>1.0</td>
<td>1.5</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Badway - Typical</td>
<td>0.0</td>
<td>0.5</td>
<td>1.0</td>
<td>1.5</td>
<td>1.8</td>
<td>2.0</td>
</tr>
</tbody>
</table>

*Note: (1) Temper Hxx: Cold Worked Tempers by Cold Rolling (from ASTM B-601)*
One of the most discussed aspects of alloy selection is strength versus conductivity. It is often the case that many alloys will sacrifice conductivity for strength.

In contrast, alloy C19010 has high conductivity for yield strengths up to 80 ksi. (Figure 3)

Note: ksi = 1,000 pounds/in²

Conversions
1 psi = 0.0068948 MPa
1 ksi = 6.8948 MPa
1% IACS = 0.58 m/(Ω·mm²)

Today’s business environment has drastically changed from that of 30, or even 10 years ago. Not only do many companies compete in a global marketplace, but they also design, test, and manufacture products in a “global factory.” Competitive pressures continue to shrink new product development cycle time requirements. In this environment, the streamlining of raw materials is an excellent way to shrink time to market while controlling costs. Of all the alloys compared that have good formability, and stand up to 125°C temperatures, only C19010 surpasses 50% IACS conductivity, making it an excellent candidate for connector alloy consolidation.

To consolidate and standardize alloys in a global factory, it is also necessary to have a global supply base for raw materials. Alloy C19010 is available globally; you will find the same uniform properties and tempers, the same quality workmanship and the same exceptional product made to your demanding standards and requirements no matter what corner of the world you are designing in.

Engineers today are looking at products of tomorrow, C19010 has been designed to meet your needs both today and in the future.
Connector Alloy for Electrical and Electronic Applications

### Chemical Composition

<table>
<thead>
<tr>
<th>Element</th>
<th>Wt. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>Balance</td>
</tr>
<tr>
<td>Nickel</td>
<td>0.8-1.8</td>
</tr>
<tr>
<td>Silicon</td>
<td>0.15-0.35</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>0.01-0.05</td>
</tr>
<tr>
<td>Other</td>
<td>0.50 max</td>
</tr>
</tbody>
</table>

### Physical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>SI Unit</th>
<th>US Customary Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting Point</td>
<td>1062 (˚C)</td>
<td>1944 (˚F)</td>
</tr>
<tr>
<td>Density</td>
<td>8.9 (gm/cm³ @ 20°C)</td>
<td>0.322 (lbs/in³) @68°F</td>
</tr>
<tr>
<td>Electrical Conductivity (Anealed)</td>
<td>34.8 m/Ωmm²</td>
<td>60 (%IACS) @68°F</td>
</tr>
<tr>
<td>Thermal Conductivity (Anealed)</td>
<td>0.62 (cal•cm/cm²•sec•C@20°C)</td>
<td>149 Btu•ft/ft²•hr•˚F @68°F</td>
</tr>
<tr>
<td>Modulus of Elasticity (Tension)</td>
<td>131,000 MPa</td>
<td>19,000 ksi</td>
</tr>
</tbody>
</table>

### Mechanical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>SI Unit</th>
<th>US Customary Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength (MPa)</td>
<td>R360 360-430</td>
<td>R410 410-470</td>
</tr>
<tr>
<td>Yield Strength (0.2% Offset, MPa)</td>
<td>R460 460-520</td>
<td>R490 490-560</td>
</tr>
<tr>
<td>Elongation (%)</td>
<td>R520 520-580</td>
<td>R580 580-650</td>
</tr>
<tr>
<td>Hardness (HV) ref.</td>
<td>H01 100-130</td>
<td>H02 125-155</td>
</tr>
<tr>
<td>Conductivity (Min m/Ωmm²)</td>
<td>H03 135-165</td>
<td>H04 145-175</td>
</tr>
<tr>
<td>Conductivity (m/Ωmm², Typical)</td>
<td>H06 150-180</td>
<td>H08 170-200</td>
</tr>
</tbody>
</table>

Note: (1) Temper Hxx: Cold Worked Tempers by Cold Rolling (from ASTM B-601)
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An Intelligent Solution

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