CuSn5 is a solid solution strengthened copper alloy with 5% tin (bronze). It combines very good cold workability with high strength and hardness. The alloy is corrosion resistant and can be well soldered and brazed, yet it still has good electrical conductivity.

CuSn5 is used in applications where great importance is attached to the combination of conductivity and strength. Fields of application are connectors, connector springs, springs and components of electrical and mechanical engineering.

### Composition

<table>
<thead>
<tr>
<th>Cu</th>
<th>Sn</th>
<th>P</th>
<th>Pb</th>
<th>Zn</th>
</tr>
</thead>
<tbody>
<tr>
<td>[%]</td>
<td>[%]</td>
<td>[%]</td>
<td>[%]</td>
<td>[%]</td>
</tr>
<tr>
<td>rem</td>
<td>4.5-5.5</td>
<td>0.01-0.4</td>
<td>0.02 max</td>
<td>0.2 max</td>
</tr>
</tbody>
</table>

Composition of this alloy is in accordance with RoHS for electric & electronic components and ELV for the automotive industry.

### Physical properties

<table>
<thead>
<tr>
<th>Melting point</th>
<th>Density</th>
<th>$c_p$ @ 20°C</th>
<th>Young’s modulus</th>
<th>Thermal cond.</th>
<th>Electrical cond.</th>
<th>$\alpha_{20-300°C}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>[°C]</td>
<td>[g/cm³]</td>
<td>[kJ/kgK]</td>
<td>[GPa]</td>
<td>[W/mK]</td>
<td>[MS/m]</td>
<td>[%IACS]</td>
</tr>
<tr>
<td>1049</td>
<td>8.9</td>
<td>0.377</td>
<td>120</td>
<td>96</td>
<td>≥ 10</td>
<td>≥ 17</td>
</tr>
</tbody>
</table>

Note: The specified conductivity applies to the soft condition only.

$c_p$: specific heat capacity
$\alpha$: coefficient of thermal expansion

### Mechanical properties

<table>
<thead>
<tr>
<th>Tensile Strength</th>
<th>Yield Strength</th>
<th>Elongation $A_{50}$</th>
<th>Hardness HV</th>
<th>Bend ratio 90° [r]</th>
<th>Bend ratio 180° [r]</th>
</tr>
</thead>
<tbody>
<tr>
<td>R310</td>
<td>310-390</td>
<td>≤ 250</td>
<td>≥ 45</td>
<td>75-105</td>
<td>0</td>
</tr>
<tr>
<td>R400</td>
<td>400-500</td>
<td>≥ 240</td>
<td>≥ 14</td>
<td>120-160</td>
<td>0</td>
</tr>
<tr>
<td>R490</td>
<td>490-580</td>
<td>≥ 430</td>
<td>≥ 8</td>
<td>160-190</td>
<td>0</td>
</tr>
<tr>
<td>R550</td>
<td>550-640</td>
<td>≥ 510</td>
<td>≥ 4</td>
<td>180-210</td>
<td>0</td>
</tr>
<tr>
<td>R630</td>
<td>630-720</td>
<td>≥ 600</td>
<td>≥ 2</td>
<td>200-230</td>
<td>1.5</td>
</tr>
<tr>
<td>R690</td>
<td>≥ 690</td>
<td>≥ 670</td>
<td>-</td>
<td>≥ 220</td>
<td>2.5</td>
</tr>
</tbody>
</table>

$r = x \times t$ (thickness t ≤ 0.5mm)

GW bend axis transverse to rolling direction. BW bend axis parallel to rolling direction.

### Fabrication properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold formability</td>
<td>excellent</td>
</tr>
<tr>
<td>Hot formability</td>
<td>not recommended</td>
</tr>
<tr>
<td>Soldering</td>
<td>excellent</td>
</tr>
<tr>
<td>Brazing</td>
<td>excellent</td>
</tr>
<tr>
<td>Oxyacetylene welding</td>
<td>fair</td>
</tr>
<tr>
<td>Gas shielded arc welding</td>
<td>good</td>
</tr>
<tr>
<td>Resistance welding</td>
<td>good</td>
</tr>
<tr>
<td>Machinability</td>
<td>not recommended</td>
</tr>
</tbody>
</table>

### Electrical conductivity

The electrical conductivity depends on chemical composition, the level of cold deformation and the grain size. A high level of deformation as well as a small grain size decrease the conductivity.
Corrosion Resistance
Bronce is resistant to: Natural and industrial atmospheres as well as maritime air, drinking and service water (if the flow rate is not excessive), seawater, non oxidizing acids, alkaline solutions and neutral saline solutions.
Bronce is not resistant to: Ammonia, halogenide, cyanide and hydrogen sulfide solutions and atmospheres, oxidizing acids.
Bronce alloys have an improved resistivity towards seawater and pitting corrosion.

Typical uses
Automotive, components of electrical engineering, connectors, relays and conductor springs, retaining clamps, springs, metal hose, bushings and mechanical and apparatus engineering.

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