

# CuSn4

20 04

Comparable standards: UNS C51100 • EN CW450K • JIS C5111  
 Aurubis designations: C511 • PNA 284 • CuSn4

## Description

CuSn4 is a solid solution strengthened copper alloy with 4% 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.  
 CuSn4 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

Cu	Sn	P	Zn	Fe	Pb
[%]	[%]	[%]	[%]	[%]	[%]
rem	3.5-4.9	0.03-0.35	0.3 max	0.1 max	0.05 max

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

## Physical properties

Melting point	Density	c <sub>p</sub> @ 20°C	Young's modulus	Thermal cond.	Electrical cond.		α @20-300°C
					[MS/m]	[%IACS]	
[°C]	[g/cm <sup>3</sup> ]	[kJ/kgK]	[GPa]	[W/mK]			[10 <sup>-6</sup> /K]
1063	8.9	0.377	120	100	≥ 12	≥21	18

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

c<sub>p</sub> specific heat capacity

α coefficient of thermal expansion

## Mechanical properties

	Tensile Strength	Yield Strength	Elongation A <sub>50</sub>	Hardness HV	Bend ratio 90° [r]		Bend ratio 180° [r]	
					GW	BW	GW	BW
	[MPa]	[MPa]	[%]	[-]				
R290	290-390	≤ 190	≥ 40	70-100	0	0	0	0
R390	390-490	≥ 210	≥ 11	115-155	0	0	0	0
R480	480-570	≥ 420	≥ 4	150-180	0	0	0	2
R540	540-630	≥ 490	≥ 3	170-200	0	1	2	3
R610	≥ 610	≥ 540	-	≥ 190	1	2	3	4

r = x \* t (thickness t ≤ 0.5mm)

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

## Fabrication properties

Cold formability	excellent
Hot formability	not recommended
Soldering	excellent
Brazing	excellent
Oxyacetylene welding	fair
Gas shielded arc welding	good
Resistance welding	good
Machinability	not recommended

## 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.

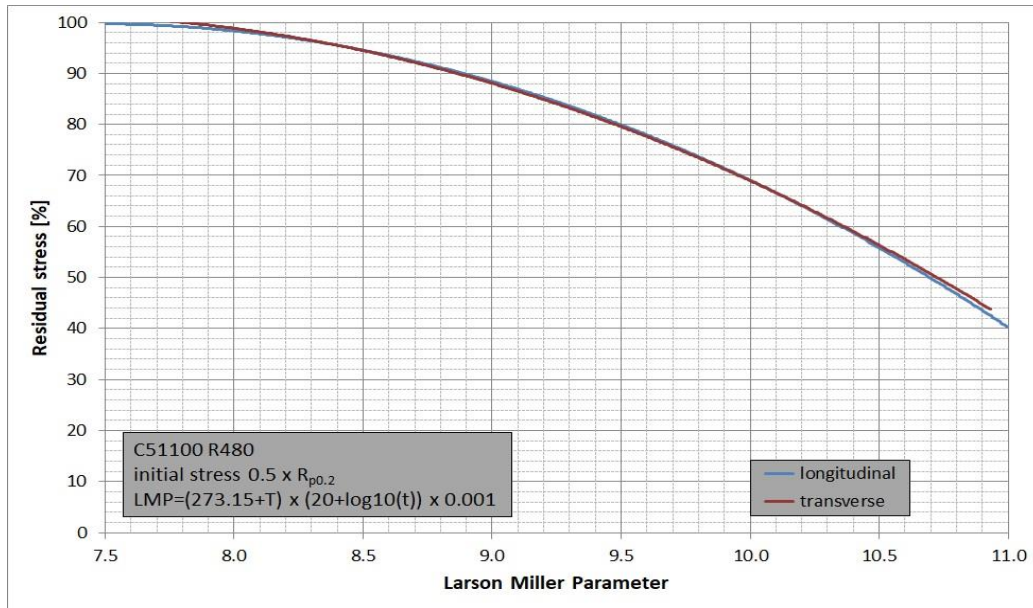
**Corrosion Resistance**

Bronze 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.  
 Bronze is not resistant to: Ammonia, halogenide, cyanide and hydrogen sulfide solutions and atmospheres, oxidizing acids.  
 Bronze 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.

**Relaxation Behaviour**



Stress relaxation data shown as residual stress against Larson Miller Parameter. The Larson Miller Parameter represents temperature and time.  
 Test method: Mandrel test according to ASTM E328.

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