Wieland-B15

CuSn5 | C51000 | CW451K

CuSn5 is the most frequently used phosphor bronze in North America (European equivalent: CuSn6). It is characterized by a favorable combination of cold formability, strength, electrical conductivity and spring properties. It even provides reasonable thermal stability. This makes CuSn5 strip a prime candidate for signal connectors produced by stamping and bending operations, which require a certain spring force. It is also very frequently used for compliant pins with a flexible press-fit zone. The temperature stability of this alloy allows application even at elevated service temperatures. Thermal relaxation is negligible at 100 °C and acceptable up t o 120 °C.

Chemical composition (Reference)	
Sn	5 %
Cu	remainder

Physical properties (Reference values at room temperature)				
Electrical conductivity	11	MS/m	19	%IACS
Thermal conductivity	82	W/(m·K)	47	Btu·ft/(ft²·h·°F)
Coefficient of electrical resistance*	0.9	10^{-3}/K	0.5	10^{-3}/°F
Coefficient of thermal expansion*	17.8	10^{-6}/K	9.9	10^{-6}/°F
Density	8.85	g/cm³	0.320	lb/in³
Modulus of elasticity	120	GPa	17,500	ksi
Specific heat	0.377	J/(g·K)	0.090	Btu/(lb·°F)
Poisson´s ratio	0.34		0.34	

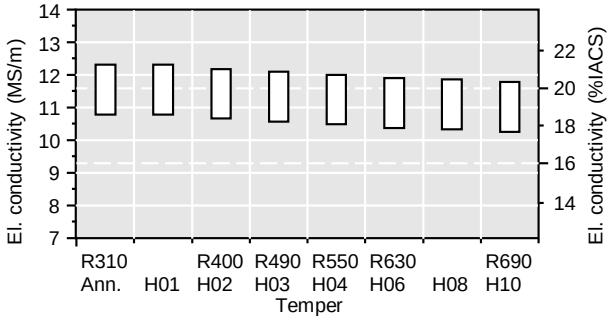
* Between 0 and 300 °C

Mechanical properties (values in brackets are for information only)

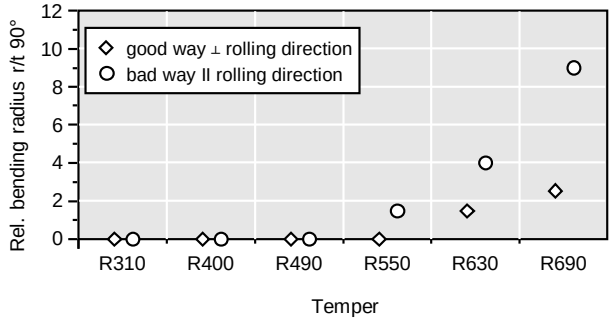
Temper	Tensile strength R_m		Yield strength $R_{p0.2}$		Elongation A_{50}	Hardness HV
	MPa	ksi	MPa	ksi	%	
R310	310-390	45-57	≤ 250	≤ 36	≥ 45	(75-105)
R400	400-500	58-72	≥ 340	≥ 49	≥ 14	(120-160)
R490	490-580	71-84	≥ 450	≥ 65	≥ 8	(160-190)
R550	550-640	80-93	≥ 520	≥ 75	≥ 4	(180-210)
R630	630-720	91-104	≥ 600	≥ 87	≥ 3	(200-230)
R690	≥ 690	≥ 100	≥ 670	≥ 97	-	(≥ 210)
Annealed*	315-385	46-56	≥ 130	≥ 19	≥ 48	
H01*	340-420	49-61	≥ 150	≥ 22	≥ 32	
H02*	400-505	58-73	≥ 325	≥ 47	≥ 10	
H03*	470-545	68-79	≥ 420	≥ 61	≥ 10	
H04*	525-625	76-91	≥ 510	≥ 74	≥ 9	
H06*	605-710	88-103	≥ 585	≥ 85	≥ 2	
H08*	655-760	95-110	≥ 635	≥ 92	≥ 1	
H10*	690-785	100-114	≥ 675	≥ 98	≥ 1	

* According to ASTM B888

Electrical conductivity



Bendability (Strip thickness t ≤ 0.5 mm)



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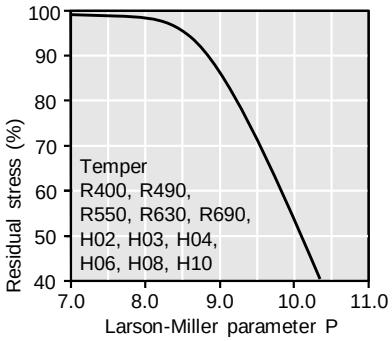
Thermal stress relaxation

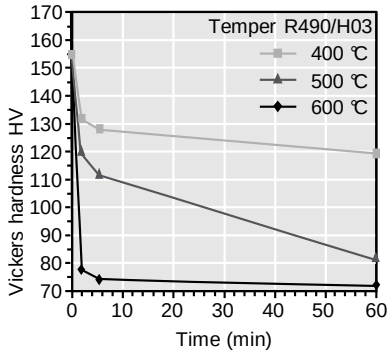


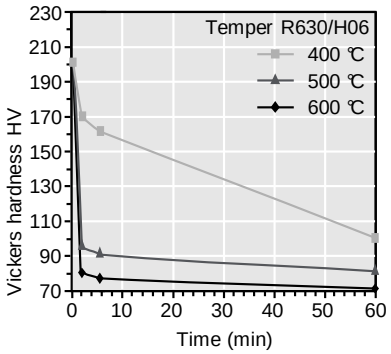
Stress remaining after thermal relaxation as a function of Larson-Miller parameter P
(F. R. Larson, J. Miller, Trans ASME74 (1952) 765–775) given by:
P = (20 + log(t))*(T + 273)*0.001.
Time t in hours, temperature T in ℃.
Example: P = 9 is equivalent to 1,000 h/118 ℃.
Measured on stress relief annealed specimens parallel to rolling direction.
Total stress relaxation depends on the applied stress level.
Furthermore, it is increased to some extent by cold deformation.

Fatigue strength

The fatigue strength is defined as the maximum bending stress amplitude which a material withstands for 10^7 load cycles under symmetrical alternate load without breaking. It is dependent on the temper tested and is about 1/3 of the tensile strength R_m.

Resistance to softening





Vickers hardness after heat treatment (typical values)

Types and formats available

- Standard coils with outside diameters up to 1,400 mm
- Traverse-wound coils with drum weights up to 1.5 t
- Multicoil up to 5 t
- Hot-dip tinned strip
- Contour-milled strip
- Sheet
- Strip and sheet with protective coating

Dimensions available

- Strip thickness from 0.10 mm, thinner gauges on request
- Strip width from 3 mm, however min. 10 x strip thickness

Wieland-Werke AG | Graf-Arco-Straße 36 | 89079 Ulm | Germany
info@wieland.com | wieland.com
Wieland Rolled Products North America | 4803 Olympia Park Plaza, Suite 3000 | Louisville, Kentucky | USA
infona@wieland.com | wieland-rolledproductsna.com

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