WIELAND-B15

CuSn5

C51000

ROLLED PRODUCTS

Material Designation	
EN	CW451K
UNS*	C51000

**Unified Numbering System (USA)*

Chemical Composition (Reference)	
Sn	5 %
Cu	balance

Typical Applications

- Stamped parts
- Connectors
- Contact springs

Physical Properties*		
Electrical Conductivity	MS/m % IACS	11 19
Thermal Conductivity	W/(m·K)	96
Coefficient of Electrical Resistance**	10^{-3}/K	0.9
Coefficient of Thermal Expansion**	10^{-6}/K	18.0
Density	g/cm³	8.85
Modulus of Elasticity	GPa	120
Specific Heat	J/(g·K)	0.380
Poisson's Ratio		0.34

* *Reference values at room temperature*

** *Between 0 and 300 °C*

Fabrication Properties	
Capacity for Being Cold Worked	excellent
Machinability	less suitable
Capacity for Being Electroplated	excellent
Capacity for Being Hot-Dip Tinned	excellent
Soft Soldering	excellent
Resistance Welding	good
Gas Shielded Arc Welding	good
Laser Welding	good

Corrosion Resistance

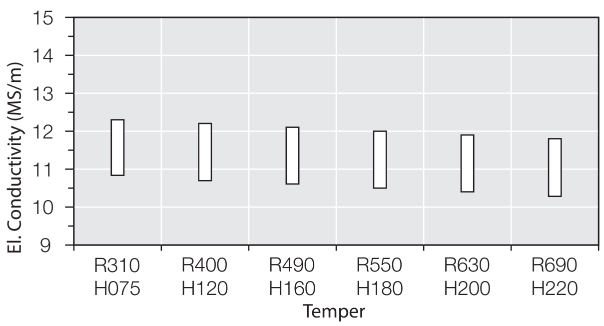
Resistant to seawater and industrial atmosphere. Largely insensitive to stress corrosion cracking.

Mechanical Properties							
Temper		**R310**	**R400**	**R490**	**R550**	**R630**	**R690**
Tensile Strength R_m	MPa	310–390	400–500	490–580	550–640	630–720	≥ 690
Yield Strength $R_{p0,2}$	MPa	≤ 250	≥ 340	≥ 450	≥ 520	≥ 600	≥ 670
Elongation A_{50mm}	%	≥ 45	≥ 14	≥ 8	≥ 4	≥ 3	–

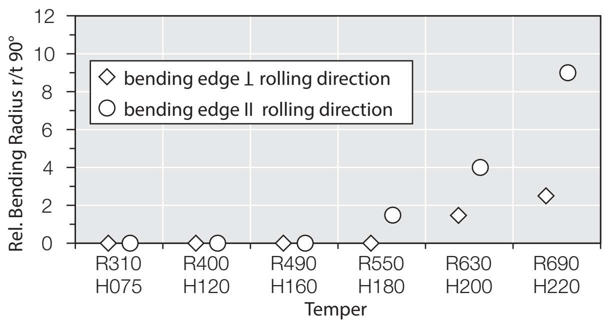
Intermediate tempers are feasible. Higher elongation values can be obtained by additional heat treatments.

Temper	H075	H120	H160	H180	H200	H220
Hardness HV	75–105	120–160	160–190	180–210	200–230	≥ 220

Electrical Conductivity



Bendability (Strip Thickness t ≤ 0.5 mm)



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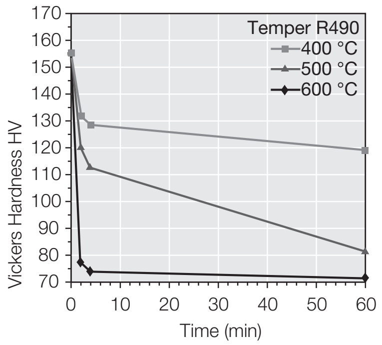
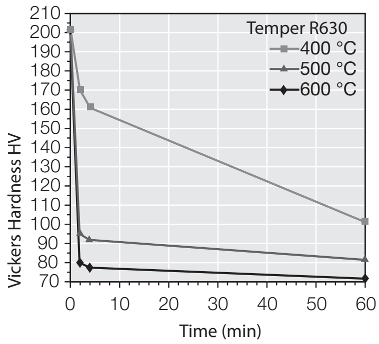
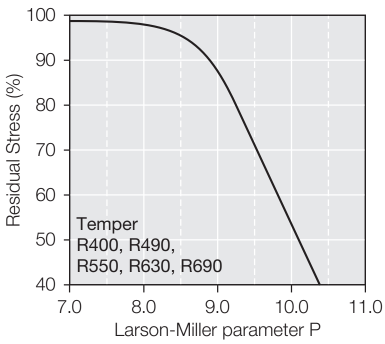
Resistance to Softening





Vickers hardness after heat treatment (typical values)

Thermal Stress Relaxation



Stress remaining after thermal relaxation as a function of Larson-Miller parameter P (F. R. Larson, J. Miller, TransASME74 (1952) 765–775) given by:

P = (20 + log(t))*(T + 273)*0.001.

Time t in hours, temperature T in °C.

Example: P = 9 is equivalent to 1.000 h/118 °C.

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 ⅓ of the tensile strength R_m.

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
- Multicoils 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 **wieland.com**

Graf-Arco-Str. 36, 89079 Ulm, Germany, Phone +49 731 944 2030, info@wieland.com

05/18 Bm (GSK/Mu)