C19025

CuNi1Sn1P

C19025 is one of the more versatile copper alloys in the Wieland product portfolio meeting the needs of automotive, electronics and electrical markets. This alloy was developed in the late 1990s to meet the increasing requirements of current carrying capacity, service temperature survivability, spring strength, while maintaining good formability demanded by the automotive terminal design engineers.

Chemical composition (Reference)	
Ni	1 %
Sn	1 %
P	0.05 %
Cu	balance

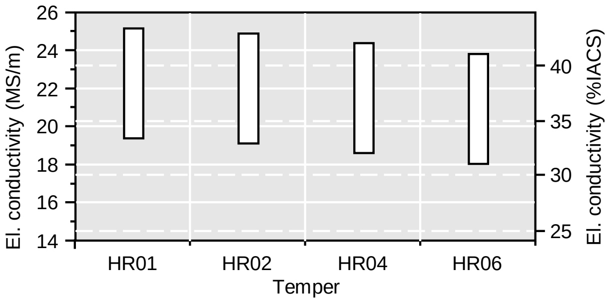
Physical properties (Reference values at room temperature)				
Electrical conductivity	23	MS/m	40	%IACS
Thermal conductivity	173	W/(m·K)	100	Btu·ft/(ft²·h·℉)
Coefficient of electrical resistance*	1.6	10^{-3}/K	0.9	10^{-3}/℉
Coefficient of thermal expansion*	16.9	10^{-6}/K	9.4	10^{-6}/℉
Density	8.91	g/cm³	0.322	lb/in³
Modulus of elasticity	129	GPa	18,800	ksi
Specific heat	0.377	J/(g·K)	0.090	Btu/(lb·℉)
Poisson´s ratio	0.34		0.34	

* Between 0 and 300 ℃

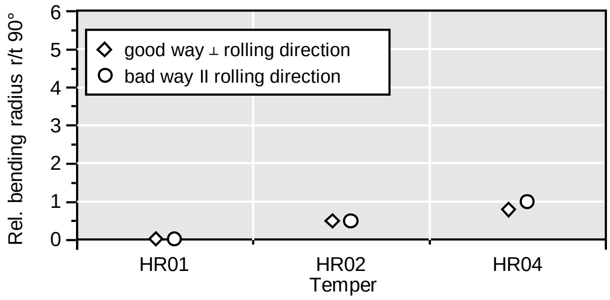
Mechanical properties (values in brackets are for information only)

Temper	Tensile strength R_m		Yield strength $R_{p0.2}$		Elongation A_{50} / $A_{2"}$
	MPa	ksi	MPa	ksi	%
HR01	340-470	49-68	≥ 290	≥ 42	≥ 15
HR02	435-525	63-76	≥ 400	≥ 58	≥ 9
HR04	495-570	72-83	≥ 470	≥ 68	≥ 5
HR06	540-615	78-89	≥ 510	≥ 74	≥ 4

Electrical conductivity



Bendability* (Strip thickness t ≤ 0.4 mm)



* Typical 90° bend formability. Data for reference only.

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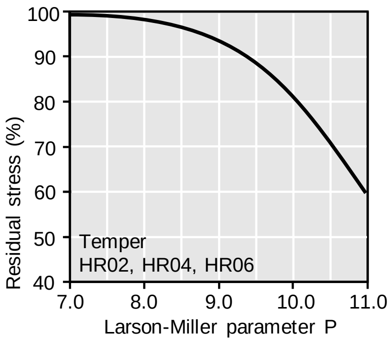
Thermal stress relaxation



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.

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

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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