Wieland-K73

CuNi1ZnSi | C19005

Wieland-K73, alloy C19005, is another established member of the low-alloyed CuNiSi family which is popular for electrical connectors. This alloy was developed in order to provide an improved stability in elevated temperature environments compared to C19010. The combination of high strength and good electrical conductivity is achieved through precipitation-hardening effects due to the existence of small amounts of nickel and silicon.

Chemical composition (Reference)	
Ni	1.5 %
Si	0.3 %
Zn	0.4 %
Cu	balance

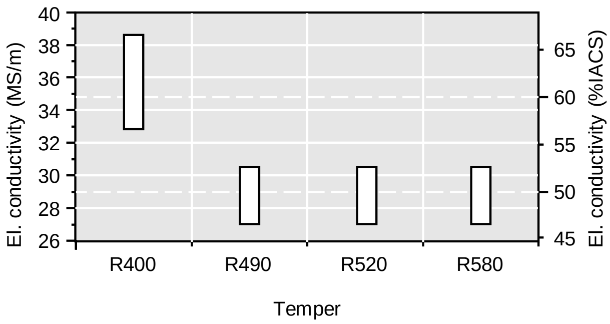
Physical properties (Reference values at room temperature)				
Electrical conductivity	29	MS/m	50	%IACS
Thermal conductivity	250	W/(m·K)	144	Btu·ft/(ft^2·h·℉)
Coefficient of electrical resistance*	2.0	10^{-3}/K	1.1	10^{-3}/℉
Coefficient of thermal expansion*	16.8	10^{-6}/K	9.3	10^{-6}/℉
Density	8.89	g/cm^3	0.321	lb/in^3
Modulus of elasticity	127	GPa	18,400	ksi
Specific heat	0.377	J/(g·K)	0.090	Btu/(lb·℉)
Poisson´s ratio	0.34		0.34	

* Between 0 and 300 ℃

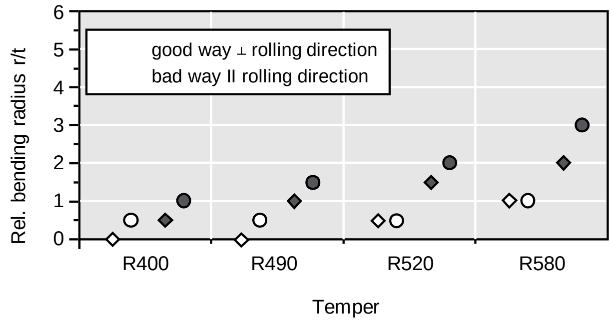
Mechanical properties (values in brackets are for information only)

Temper	Tensile strength R_m		Yield strength $R_{p0.2}$		Elongation A_{50}	Hardness HV
	MPa	ksi	MPa	ksi	%	
R400	400-460	58-67	≥ 360	≥ 52	≥ 8	(120-150)
R490	490-550	71-78	≥ 410	≥ 59	≥ 10	(140-170)
R520	520-590	75-86	≥ 440	≥ 63	≥ 9	(150-180)
R580	580-650	84-94	≥ 540	≥ 78	≥ 8	(170-200)

Electrical conductivity



Bendability (Strip thickness t ≤ 0.5 mm) ◇○90° ◆●180°



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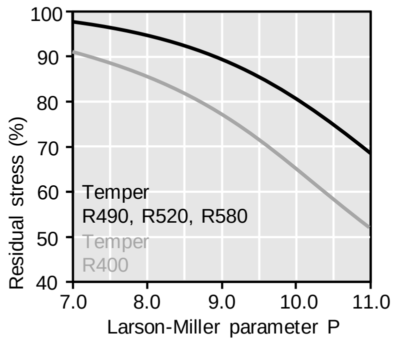
Thermal stress relaxation

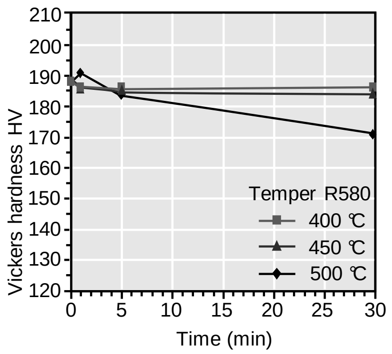


Stress remaining after thermal relaxation as a function of Larson-Miller parameter P
(F. R. Larson, J. Miller, Trans ASME74 (1952) 765–775) given by:
$P = (20 + \log(t)) \cdot (T + 273) \cdot 0.001$.
Time t in hours, temperature T in ℃.
Example: P = 9 is equivalent to 1,000 h/118 ℃.
Measured on stress 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.

Softening resistance



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

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