CuNiSi

EN_2024_06

Comparable standards: UNS C19005

Aurubis designations: • PNA 326

Description

PNA 326 is an optimized version of CuNi1.5Si, which is a precipitation-hardened copper alloy. It combines medium electrical conductivity (min. 47% IACS) with high strength and good relaxation behaviour. This is achieved by the application of a special process consisting of cold working and heat treatment. It also has excellent spring properties and good corrosion resistance.

Composition

Cu [%]	Ni [%]	Si [%]	Zn [%]	Sn [%]	P [%]
rem	1.4-1.7	0.2-0.35	0.2-0.7	0.02-0.3	0.01-0.03

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

Physical properties

Melting point [°C]	Density [g/cm³]	c_p @ 20°C [kJ/kgK]	Young's modulus [GPa]	Thermal cond. [W/mK]	Electrical cond. [MS/m]	Electrical cond. [%IACS]	α @20-300°C [10^{-6}/K]
1062	8.9	0.377	135	250	≥ 27	≥47	16.8

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

c_p specific heat capacity

α coefficient of thermal expansion

Mechanical properties

	Tensile Strength [MPa]	Yield Strength [MPa]	Elongation A_{50} [%]	Hardness HV [-]	Bend ratio 90° [r] GW	Bend ratio 90° [r] BW	Bend ratio 180° [r] GW	Bend ratio 180° [r] BW
R360	360-430	≥275	≥ 8	100-130	0	0	0	0.5
R410	410-470	≥370	≥ 7	120-140	0	0.5	0.5	1
R460	460-520	≥410	≥ 5	140-160	0.5	1	1	3
R490	490-560	≥435	≥ 4	150-170	1	1.5	2	3.5
R520	520-590	≥460	≥ 3	155-180	1	2	2.5	4
R490S*	490-560	≥410	≥ 10	150-170	0	0	1	1
R520S*	520-590	≥440	≥ 8	155-180	0.5	0	1.5	1.5
R580S*	580-650	≥510	≥ 7	170-200	0.5	0.5	1.5	2
R620S	620-700	≥560	≥ 6	180-210	1	1.5	3	5

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	good
Hot formability	excellent
Soldering	good
Brazing	good
Oxyacetylene welding	good
Gas shielded arc welding	good
Resistance welding	good
Machinability	fair

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.

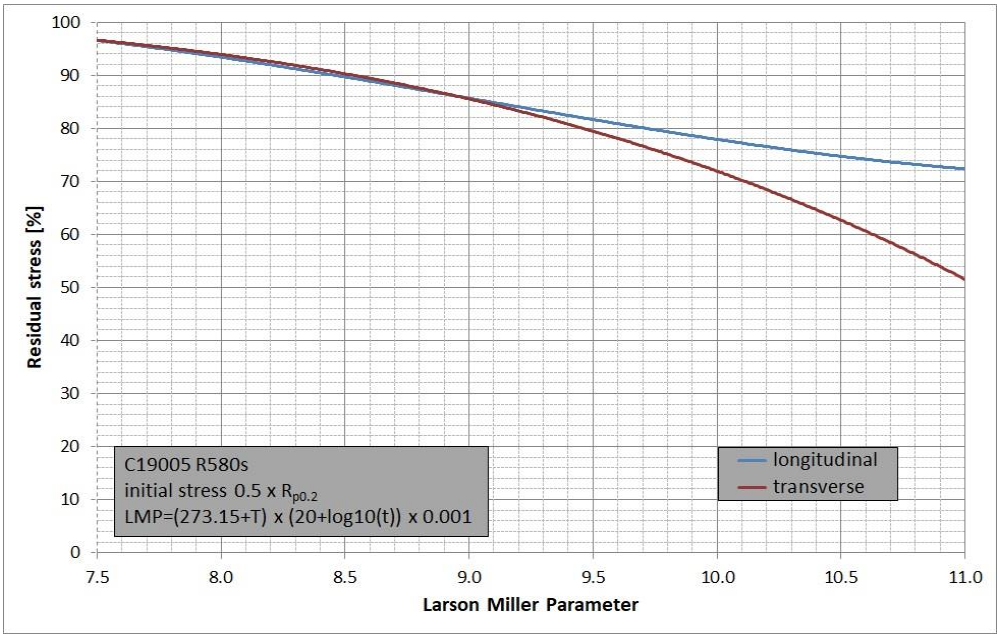
Corrosion Resistance

CuNiSi is resistant to: Natural and industrial atmospheres as well as maritime air, drinking and service water, non oxidizing acids, alkaline solutions and neutral saline solutions.
CuNiSi is not resistant to: Ammonia, halogenide, cyanide and hydrogen sulfide solutions and atmospheres, oxidizing acids and sea water (especially at high flow rates).

Typical uses

Automotive, components of electrical engineering, connectors, springs, relays, sockets, clips, leadframes, pins

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.