

CuNi3SiMg

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Comparable standards: UNS C70250
Aurubis designations: C7025 • PNA 370

Description

CuNi3SiMg is a precipitation-hardened copper alloy. It combines moderate electrical conductivity (min. 40% IACS) with very high strength and very good relaxation behaviour. This is achieved by the application of a special process consisting of cold working and heat treatment. CuNi3SiMg also has excellent spring properties and good corrosion resistance. Fields of application are contact springs, automotive, connectors, leadframes and electrical engineering.

Composition

Cu	Ni	Si	Mg	Zn	Pb
[%]	[%]	[%]	[%]	[%]	[%]
rem	2.2-4.2	0.25-1.2	0.05-0.3	<1.0	≤0.05

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

Physical properties

Melting point	Density	c_p @ 20°C	Young's modulus	Thermal cond.	Electrical cond.		α @20-300°C
[°C]	[g/cm ³]	[kJ/kgK]	[GPa]	[W/mK]	[MS/m]	[%IACS]	[10 ⁻⁶ /K]
1095	8.82	0.399	130	169	≥ 23	≥40	17.6

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

c_p specific heat capacity

α coefficient of thermal expansion

Mechanical properties

	Tensile Strength	Yield Strength	Elongation A ₅₀	Hardness HV	Bend ratio 90° [r]	
	[MPa]	[MPa]	[%]	[-]	GW	BW
R620	620-760	≥450	≥ 10	180-240	0	0
R650	650-830	≥590	≥ 7	190-250	1	1
R690	690-860	≥650	≥ 5	220-260	1.5	1

$r = x \cdot t$ (thickness $t \leq 0.5\text{mm}$)

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.

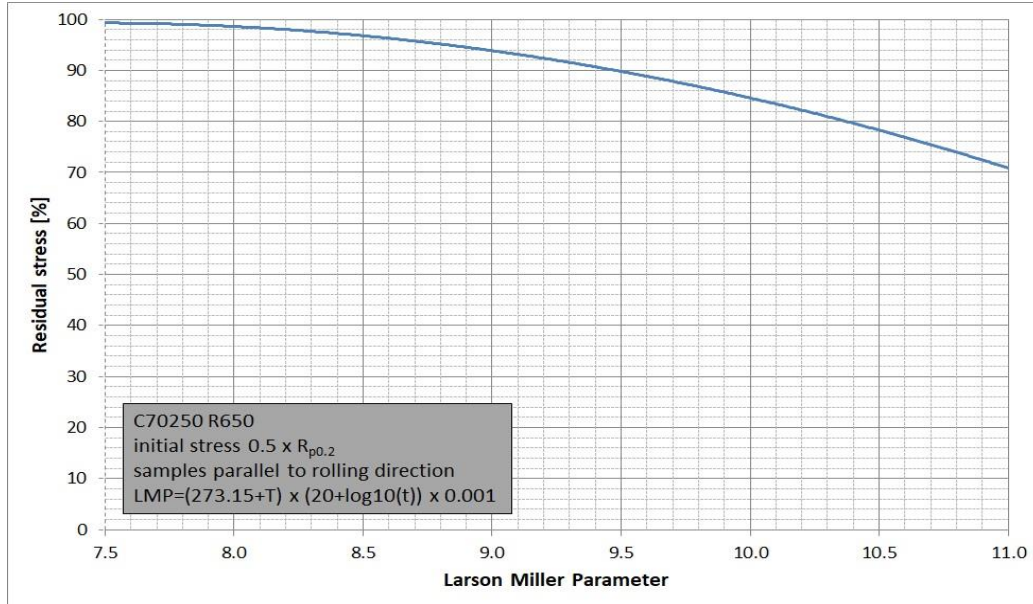
Corrosion Resistance

CuNi3SiMg 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.
 CuNi3SiMg 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, contact springs, relays, sockets, clips, leadframes, pins

Relaxation Behaviour



Stress relaxation data of CuNi3SiMg shown as residual stress against Larson Miller Parameter. The Larson Miller Parameter represents temperature and time.
 Test method: Mandrel test according to ASTM E328.

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