CuFe2PMg

EN_2024_03

Comparable standards: UNS C19400 • EN CW107C • JIS C1940

Aurubis designations: 194M • PNA 206

Description

CuFe2PMg, a modification of alloy CuFe2P, combines strength with good electrical (min. 62% IACS) and thermal conductivity. The addition of a small amount of magnesium enables age hardening and results in higher strength levels compared to CuFe2P. Plasticity and stress relaxation behavior are also improved.
The alloy exhibits a very good formability, can be soldered and welded and has a good corrosion resistance.
Fields of application are in the automotive industry, connectors, spring contacts and semiconductors

Composition

Cu [%]	Fe [%]	P [%]	Mg [%]	Zn [%]	Pb [%]
rem	2.10-2.60	0.015-0.15	0.03-0.08	0.05-0.20	0.03 max

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]
1088	8.8	0.386	123	265	≥ 35	≥60	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 [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
R300	300-340	≤ 240	≥ 16	80-100	0	0	0	0
R340	340-390	≥ 240	≥ 8	100-120	0	0	0	0
R370	370-430	≥ 330	≥ 6	120-140	0	0	0	0
R420	420-480	≥ 380	≥ 5	130-150	0.5	0.5	0.5	0
R470	470-530	≥ 440	≥ 4	140-160	0.5	0.5	0.5	1.5
R530	530-580	≥ 470	≥ 4	150-165	1	2	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	excellent
Hot formability	excellent
Soldering	excellent
Brazing	excellent
Oxyacetylene welding	good
Gas shielded arc welding	excellent
Resistance welding	not recommended
Machinability	not recommended

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.

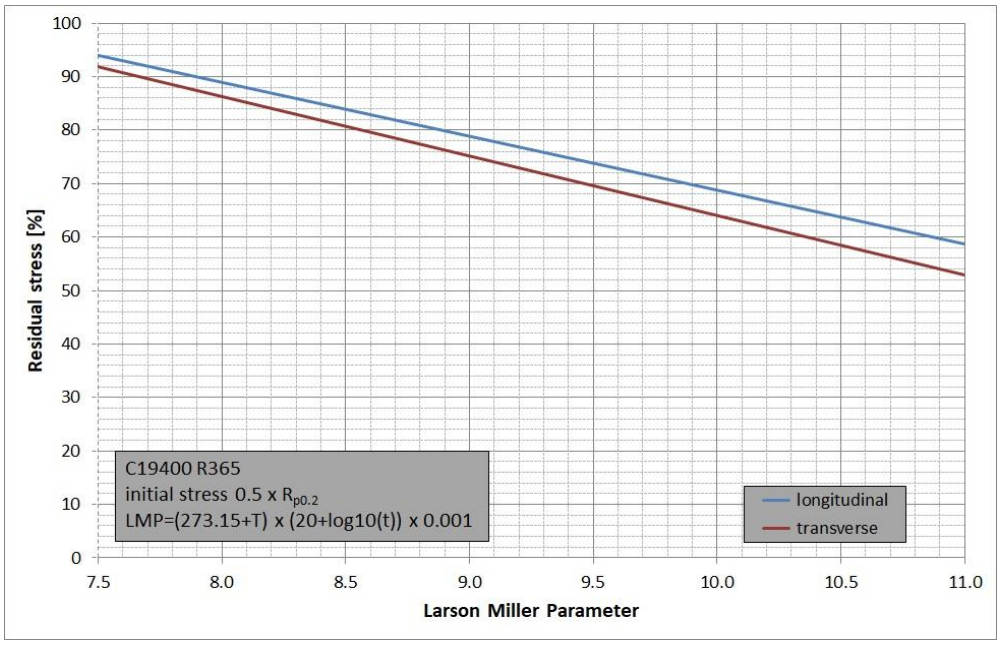
Corrosion Resistance

CuFe2PMg 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.
CuFe2PMg is not resistant to: Ammonia, halogenide, cyanide and hydrogen sulfide solutions and atmospheres, oxidizing acids and sea water (especially at high flow rates).
Cu alloys containing Fe have an improved corrosion resistance compared to pure copper, especially towards salt bearing and alkaline water. More over these alloys are more resistant to pitting- and erosion corrosion.

Typical uses

Automotive, electrical engineering, connectors, contact springs, semiconductor basis

Relaxation Behaviour



Stress relaxation data of CuFe2P shown as residual stress against Larson Miller Parameter.
The Larson Miller Parameter represents temperature and time.
Test method: Mandrel test according to ASTM E328.