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Solid metals. Fine solutions.

Wrought copper-silver alloy **CuAg** (CuAg0.10P) alloy 0120

CuAg has a very high electrical conductivity and, compared to pure copper, a significantly improved tempering resistance and improved creep behaviour at elevated temperatures. The low phosphorus addition for deoxidation results in good weldability and brazeability as well as hydrogen resistance.

ZOLLERN brand	CuAg
EN designation	CuAg0.10P
EN material no:	CW016A

EN 12420:1999 (CW008A Forging)
EN 13601:2013 round, square
EN 13605:2013 other profiles

// National designations / ISO

DIN	CuAg0.1P
DIN	2.1191
ISO	CuAg0.1(P)
USA	C10700

// Composition (weight by per cent in %)

Cu	Ag	Bi	P	Other
Rest	0.08 – 0.12	< 0.0005	0.001 – 0.007	< 0.03

oxygen content is very low, the risk of hydrogen embrittlement does not exist. Verification according to EN ISO 2626 or ASTM B577

// Strength properties at room temperature

	(minimum values)			
[1] EN 12420:1999 !!! (as CW008A) [2] EN 13601:2013 cold drawn [2] Values also for forgings [3] EN 13605:2013 min. 200 Kg	$R_{p0.2}$ N/mm²	R_m N/mm²	A_5 %	HB
[1] Forgings and die forgings (F20)	40	200	35	40
[2] Soft (F20)	<120	200	35	35 – 65
Medium hard (F22)	160	220[1)]	18	65 – 90[2)]
Hard (F25) (< Ø120mm)	220	250[1)]	12	75 – 100[2)]
[3] drawn profiles < 10 mm F24	160	240	15	65 – 95
drawn profiles < 5 mm F28	240	280	8	80 – 115

[1)] Deviating from standard EN 13601 10 N/mm² lower
[2)] Hardness values may deviate slightly +- 10 HB

// Strength properties at elevated temperatures (reference values)

Temperature	°C	20	200	300	400	500
0.2% limit	$R_{p0,2}$ N//mm²	48	45	45	37	32
Tensile strength	R_m N/mm²	225	181	162	147	108
Elongation	A_5 %	53	47	45	44	42

// Physical properties

Density at 20 °C	8.9 kg/dm³
Melting temperature/range	1082 °C
Coefficient of linear expansion	
from - 200° to 20°C	14 x 10^{-6} °C^{-1}
from 20° to 100°C	17 x 10^{-6} °C^{-1}
from 20° to 300°C	18 x 10^{-6} °C^{-1}
Thermal conductivity at 20°C	3.94 W/cm x°C
Electr. conductivity at 20°C (with higher strength from F22)	> 57.0 MS/m > 98 % IACS > 56.0 MS/m > 96 % IACS
Electr. resistance at 20°C (F20)	< 0.0175 Ω mm²/m
Temperature coefficient of the electrical resistance (0 - 100°C)	0.00393 °C^{-1}
Permeability	< 1.01
Young's modulus	124 KN/mm²

// Dynamic strength values at room temperature (reference values)

Rotational bending fatigue strength R_{bw} at 10^6 load cycles, 50% cold-formed	103 N/mm²
Notched impact energy (ISO - V/KV)	- joules

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Areas of application

Due to the high electrical and thermal conductivity as well as the improved tempering resistance and creep behaviour compared to SE-Cu, CuAg is used primarily in

- electrical engineering with simultaneous thermal stress. Examples are profile bars for commutator bars, short-circuit bars, collector rings or contacts.
- Continuous casting moulds for non-ferrous metals and steel also benefit from the improved tempering resistance, as do forged parts for jet drives.

The improvement in creep behaviour is shown following comparison.

// Experimental conditions	// Creep extension
Stress 96.5 N/mm² Temperature 175°C Test time 1000 h	1.12 % for SE-Cu 0.09 % for Cu Ag 0.10 P

Machinability

CuAg has very good hot and cold formability.
All common types of semi-finished products such as bars, bushings, rings or open-die and drop forgings can be produced.
The machinability in the soft state is classified as moderate to poor, as long flow chips form due to the high toughness of the material.
Cold forming achieves a hardness of up to over 100 HB for thin rods or tubes, and 65-90 HB for forgings, depending on the cross-section and shape of the part.
From a wall thickness of approximately 120 mm, the core areas are softer after strain hardening.

Relaxation annealing	200 – 275°C
Soft annealing	400 – 650°C
Soft soldering	very good
Brazing	very good
Welding	Due to the high thermal conductivity preheating up to approx. 600°C is necessary for larger pieces, no danger of hydrogen brittleness
Surface treatment	easily galvanisable

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