ZOLLERN

Solid metals. Fine solutions.

Pure copper **SE-Cu** (Cu-HCP) alloy 0100

SE-Cu is a deoxidised copper with low residual phosphorus content. It is melted from cathodes, is oxygen-free and therefore has high electrical conductivity and good weldability and solderability. The main applications are in electronics and electrical engineering, as well as in applications where a high degree of heat transfer capability is required.

ZOLLERN brand	SE-Cu
EN designation	Cu-HCP (Cu-PHC)
EN material no:	CW021A (CW020A)

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

// National designations / ISO

DIN	SE-Cu
DIN	2.0070
ISO	Cu-HCP
USA	C10300
GB	C106
F	Cu-c1

// Composition (weight by per cent in % per element)

Cu [1]	Bi	P [2]	Pb	Other
min. 99.95	max. 0.0005	0.002-0.007	max.0.005	max.0.03 excl. Ag, P

[1] including silver up to max. 0.015%.
[2] Cu-PHC 0.001-0.006 %P

// Strength properties at room temperature

	(minimum values)			
[1] EN 12420:1999 !!! (like CW008A) [2] EN 13601:2013 cold drawn [2] Values also for forged parts [3] EN 13605:2013 min. 200 kg	$R_{p0.2}$ N/mm²	R_m N/mm²	A_5 %	HB
[1] Forgings and Die-forged parts (F20)	40	200	35	45
[2] Soft (F20)	<120	200	35	35 – 65
Medium hard (F22)	160	220[3]	18	65 – 90[4]
Hard (F25) (< 120 mm)	220	250[3]	12	75 – 100[4]
Pull hard (F30) (< 10 mm)	260	300	8	85 – 110[4]
[3] drawn profiles < 10 mm F24	160	240	15	65 – 95
drawn profiles < 5 mm F28	240	280	8	80 - 115

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

// Physical properties

Density at 20 °C	8.90 kg/dm³
Melting temperature/range	1083°C
Coefficient of linear expansion	
from -191 ° to 16°C	14.1 x 10^{-6} °C^{-1}
from 20° to 100°C	16.8 x 10^{-6} °C^{-1}
from 20° to 200°C	17.3 x 10^{-6} °C^{-1}
from 20° to 300°C	17.7 x 10^{-6} °C^{-1}
Specific heat capacity at 20°C	0.386 J/g x °C
Thermal conductivity at 20°C	3.94 W/cm x°C
at 100°C	3.85 W/cm x°C
at 200°C	3.81 W/cm x°C
at 300°C	3.77 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) < 0.01754 Ω mm²/m
Temperature coefficient of the electrical resistance at 20°C (valid from -100 to 200°C)	0.00393 °C^{-1}
Permeability μ	< 1.01
Young's modulus at 20°C	cold formed 130 KN/mm² annealed 110 KN/mm²

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

Rotational bending fatigue strength R_{bw} at 20 x 10^6 load cycles	70 N/mm²
Notched impact energy (ISO - V/KV)	130 joules

ZOLLERN

Solid metals. Fine solutions.

Pure copper **SE-Cu** (Cu-HCP) alloy 0100

SE-Cu is a deoxidised copper with low residual phosphorus content. It is melted from cathodes, is oxygen-free and therefore has high electrical conductivity and good weldability and solderability. The main applications are in electronics and electrical engineering, as well as in applications where a high degree of heat transfer capability is required.

Application examples

Due to its high electrical and thermal conductivity, SE-Cu is preferably used in

- electrical engineering, welding and thermal engineering.
- Short-circuit rings for motors are rough-turned or finish-turned.
- Power supply rails and exciter bars for generators.
- Components such as feeders and copper back-up bars in resistance welding machines.
- Heat sinks such as standing moulds, cooling plates e.g. in the steel industry, combustion chambers for rocket nozzles.

Machinability

SE-Cu 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	150 – 250°C
Soft annealing	250 - 500°C
Temperature range for hot forming	750 – 950°C
Machinability	moderate to difficult to machine, (long flow chips are formed)
Soft soldering	very good
Brazing	good (preferably inert gas brazing)
Welding	Due to the high thermal conductivity preheating up to approx. 600°C is necessary for larger pieces, no danger of hydrogen brittleness
Galvanisability	good

ZOLLERN GmbH & Co. KG

Hitzkofer Strasse 1
72517 Sigmaringendorf-
Laucherthal
Germany
T +49 7571 70-984
F +49 7571 70-82984
zgm@zollern.com
www.zollern.com