Rendering date: 2018-10-21 07:35:57
http://conductivity-app.org

CuSn0,2

UNS:C14410
EN:-

Manufactures list:
Aurubis (http://www.aurubis.com/en/) - STOLBERG PNA 215
KM Europa Metal AG (http://www.kme.com/) - KME STOL 80

CuSn0,2 alloy is a tin bearing copper with low phosphorus as a deoxidizer. Material has higher than pure copper softening temperature and good creep, stress relaxation fatigue resistance. The alloy permits good corrosion resistance and has no stress cracking corrosion. Material has good formability at medium strength and good conductivity. Hot dip tinning, soldering and electroplating

Basic properties

Basic properties	Value	Comments
Density [g/cm^3]	8,9	
Specific heat capacity [J/(kg*K)]	385	
Temperature coefficient of electrical resistance (0...100°C) [10^{-3}/K]	3,3	
Electrical conductivity [T=20°C, (% IACS)]	69-90	
Thermal conductivity [W/(m*K)]	330-360	
Thermal expansion coefficient 20...300°C [10^{-6}/K]	17	
[Ref: 134, 135, 136, 138, 139, 140, 145]		

Applications

Main applications

Main applications are connected with heat and electric current transfer in electro-industry, electronics, automotive. Possible applications: heat exchangers, radiator fins, connectors and connector pins, high current capacity electrical wires, conductors and cables (especially automotive cables, super fine coaxial cables, busbars and other solid and multi-wire conductors), fuse/ relay boxes, punch screen, stamped and bent parts in electro industry, pins, electric terminals and micro-terminals, electric clamps, different carriers, electronic parts carriers, leadframes, electrical springs for lower loads, contacts and sliding contacts parts, electrical switches, semiconductor devices, different electro-automotive parts, chemical and medical equipment, wire electro discharge cutting systems.
Literature [Ref: 111, 112, 113, 114, 568, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 132, 133, 134, 135, 136]

Kinds of semi-finished products/final products

Rolled strips, rolled tinned strips, rolled profiles with different height, extruded round or polygonal rods, extruded sections, extruded tubes, drawn round or polygonal wires, drawn tubes

Chemical composition

Chemical composition	Value	Comments
Cu [wt.%]	99,515-99,895	Calculated
Fe [wt.%]	0-0,05	
P [wt.%]	0,005-0,02	
Pb [wt.%]	0-0,015	
Sn [wt.%]	0,10-0,20	
Zn [wt.%]	0-0,1	
Others [wt.%]	0-0,1	
[Ref: 112]		

Mechanical properties

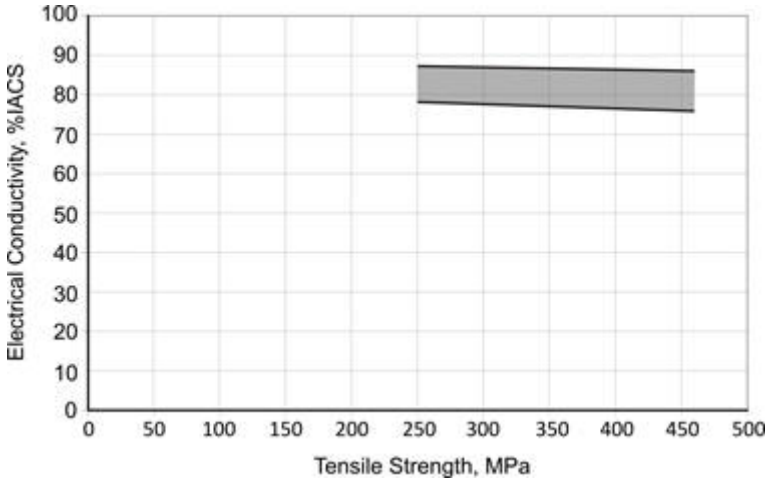
Mechanical properties	Value	Comments
UTS [MPa]	220-460	
YS [MPa]	98-410	
Elongation [%]	2-25	
Hardness	60-1340	HV
Young's modulus [GPa]	118-120	
Kirchhoff's modulus [GPa]	44	
Poisson ratio	0,34	
[Ref: 132, 134, 135, 136, 137, 138, 139, 140, 141]		

Material's mechanical and electrical properties in different tempers

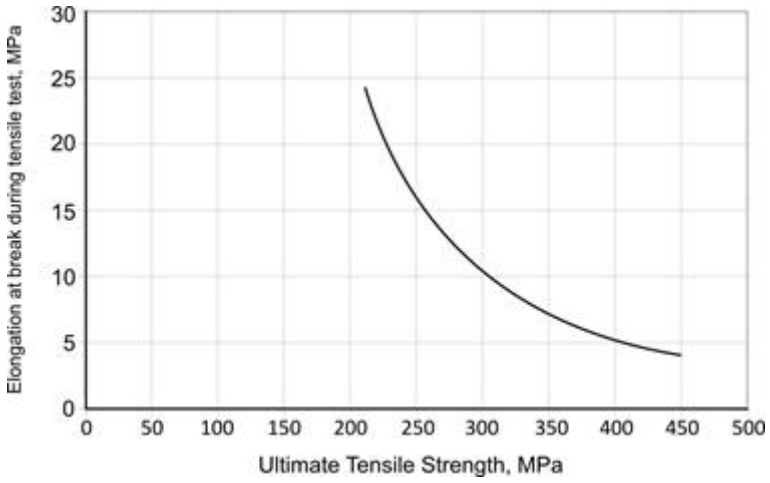
Temper	Ultimate Tensile Strength UTS [MPa]	0,2%Yield Strength YS [MPa]	Elongation at break during tensile test A50 [%]	Hardness [HV]	Literature
R250 H60	min250	min. 140	min 20	60-85	[Ref: 111, 138, 140]
R300 H85	300-370	min.270	min. 10	80-110	
R360 H105	360-430	min. 310	min. 7	110-130	
R420 H120	420-490	min. 370	min. 5	120-150	
R460 H135	min. 460	min. 410	min. 4	min. 135	

Material's mechanical and electrical properties in different tempers (non European standards)

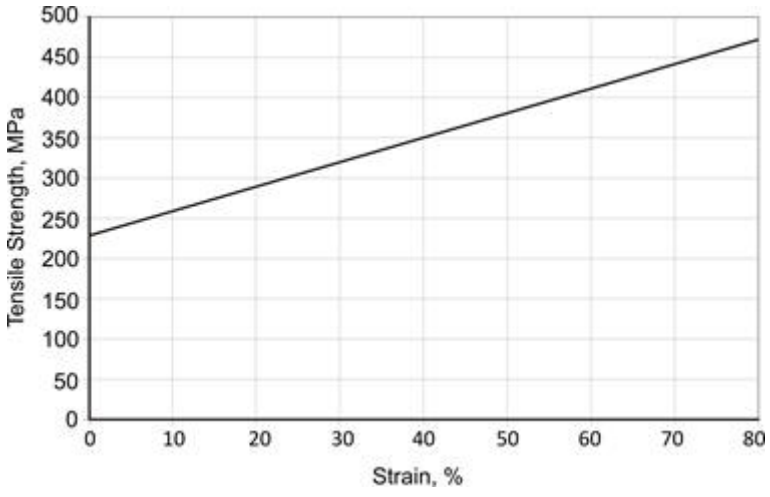
Temper	Ultimate Tensile Strength UTS [MPa]	0,2%Yield Strength YS [MPa]	Elongation at break during tensile test A50 [%]	Hardness [HV]	Literature
0	max. 216	-	min. 25	max. 90	[Ref: 134, 135, 136, 139, 141, 142]
1/4H	216-294	98-196	min 25	65-110	
1/2H	255-333	216-304	min.12	75-110	
H	314-392	294-373	min 5	95-130	
EH (spring)	350-430	min.333	-	200-140	



Levels of electrical and mechanical properties of material in different temper [Ref: 2]



Elongation at break vs ultimate tensile strength at ambient temperature for material in different temper [Ref: 2]

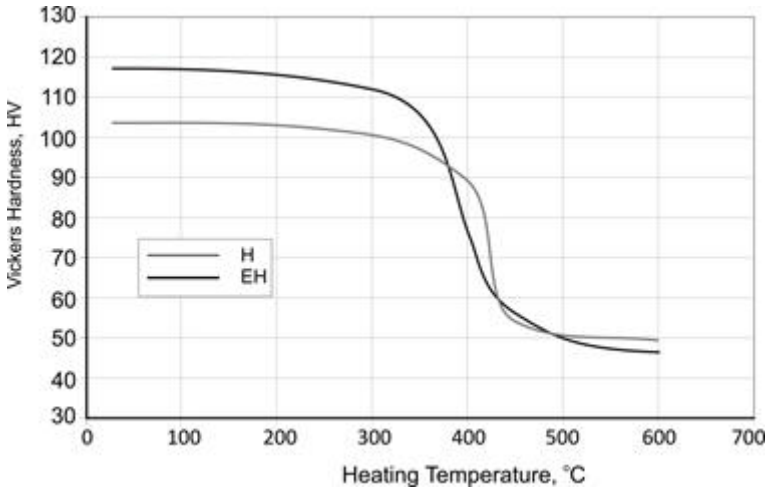


Ultimate tensile strength of material as a function of cold working strain calculated via formula based on approximation of different experimental data [Ref: 2]

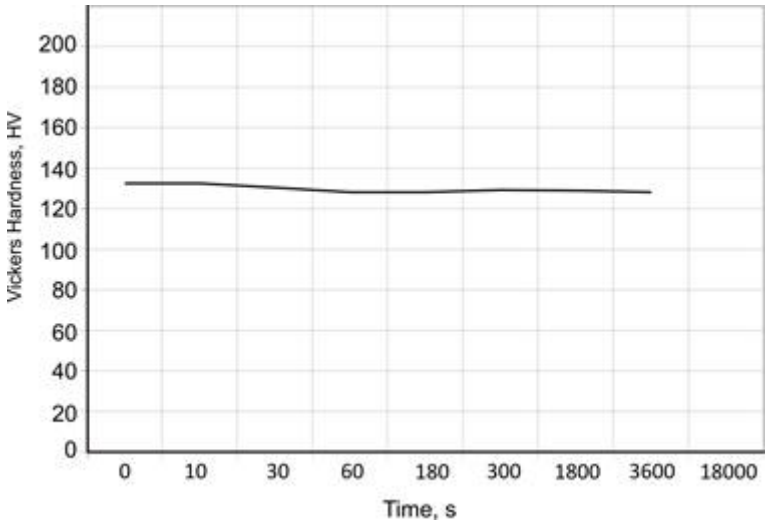
Exploitation properties

Heat resistance

Mechanical and electrical properties vs temperatures



Vickers hardness as a function of heating temperature for 30 min heating time (hardness test at ambient temperature after heating), material in hard temper (H) and extra hard temper (EH)



Vickers hardness as a function of heating time at 300oC (hardness test at ambient temperature after heating), material temper R420

Literature for entire paragraph: [Ref: 134, 140]

Long-therm heat resistance, e.g. Arrhenius curve

NO DATA AVAILABLE

Half- softening temperature

Softening temperature about 400-450oC

Corrosion resistance

Hydrogen embrittlement resistance

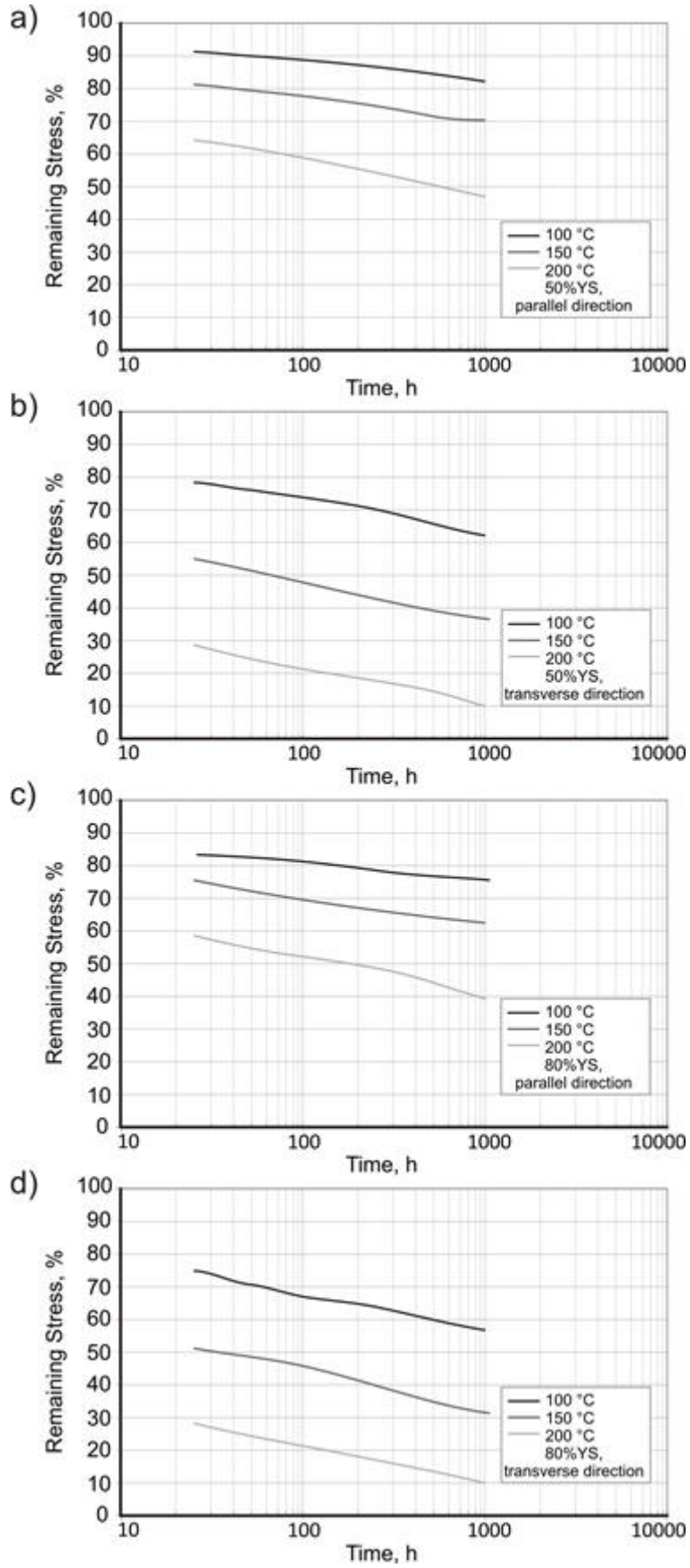
Material resistant to hydrogen embrittlement

Other kind of corrosion elements

Type of corrosion	Suitability	Literature
Atmospheric	good	[Ref: 140]
Marine environment	good	[Ref: 140]
Stress crack	resistant	[Ref: 140]
Hydrogen embrittlement	resistant	-
Electrolytic	good	[Ref: 140]
Other - oxidising acids	bad	[Ref: 140]

Rheological resistance

Stress relaxation



Stress relaxation data for material in R460 temper. Remaining stress as a function of loading time (log scale) at temperatures 100oC, 150oC, 200oC, initial stress 50% YS and 80%YS, tests in parallel and transverse directions to rolling direction [Ref: 140]

Creep

NO DATA AVAILABLE

Wear resistance

Friction resistance

NO DATA AVAILABLE

Fatigue resistance

Fatigue cracking

The fatigue strength is dependent on the temper and it is approximately 1/3 of the tensile strength under bending load for 107 load cycles. [Ref: 140]

Impact strength

NO DATA AVAILABLE

Fabrication properties

Fabrication properties	Value	Comments	Literature
Soldering	excellent		[Ref: 140]
Brazing	excellent		[Ref: 140]
Hot dip tinning	excellent		[Ref: 140]
Electrolytic tinning	excellent		[Ref: 140]
Electrolytic silvering	good		[Ref: 134]
Laser welding	good		[Ref: 140]
Gas Shielded Arc Welding	excellent		[Ref: 140]
Capacity for Being Cold Worked	excellent		[Ref: 140]
Capacity for Being Hot Formed	excellent		[Ref: 140]

Formability properties [Ref: 134, 138, 140]

Thickness t [mm] up to 0,5mm	Direction	Temper				
		R250 H60	R300 H85	R360 H105	R420 H120	R460 H135
90o	transverse	0xt	0xt	0xt	1xt	1xt
	parallel	0xt	0xt	0xt	1xt	1,5xt
180o	transverse	0xt	0xt	0,5xt	1xt	1,5xt
	parallel	0xt	0xt	1xt	1,5xt	2xt

Technological properties

Technological properties	Value	Comments
Annealling temperature [°C]	250-650	Annealling time: 1-3h
Stress relievieng temperature [°C]	150-200	Stress relievieng time: 1-3h
Hot working temperature [°C]	800-950	
[Ref: 140]		

References:

2. **Properties of copper and copper alloys at cryogenic temperatures** - Simon N. J., Drexler E.S., Reed R. P., NIST Monograph 177, National Institute of Standards and Technology, U.S. Department of Commerce, Washington, D.C., Feb 1992

111. **Copper and copper alloys – Strip for lead frames EN 1758:1997** -

112. **Application datasheet – C10100-C12099** -

113. **Data sheet - CuSn015** - Altek

114. **CuSn0,15** - Deutsche Kupferinstitut

115. **Data sheet - High-copper alloy** - Wieland-K81

116. **Data sheet - High-Performance Alloys BB01** - Diehl Metall

117. **Data sheet - Extruded/drown product** - Wieland

118. **Data sheet** - HitachiCable

119. **Data sheet - KHP15 CuSn0,15** - Kemper

120. **Data sheet** - Aurubis Slitting Centre

121. **Data sheet - Walzprodukte** - Prymetall GmgH and Co. KG

122. **Data sheet - PNA216** - Aurubis

123. **Data sheet - Semi-finished products in copper and copper alloys for power engineering** - Wieland

124. **Copper-Tin** - Diehl Metall

125. **Data sheet - Strips of Copper and Copper Alloys** - Kemper

126. **Data sheet - Strip for connectors** - Wieland

132. **Data sheet - A High Conductivity CuSn0.15 Alloy** - PMX

133. **Data sheet - Connector strips** - KME

134. **Data sheet - EFTEC-3** - Furukawa Electric

135. **COPPER ALLOY STRIPS FOR LEADFRAME** -

136. **Data sheet** - Furukawa Electrics products

137. **Copper/copper alloy foil** -

138. **Data sheet - INDUSTRIAL ROLLED – Connectors** - KME

139. **Data sheet - High Performance Copper Alloys for Leadframe** - Furukawa Electric

140. **Data sheet - CuSn0,15 KME** - KME

141. **Data sheet - CuSn** -

142. **Kato Metals Trading Co, LTD** -

145. **AS1566 Copper and copper alloys-Rolled flat products** -

568. **Data sheet - CuSn0,15 Wieland –K81** - Wieland