CuAg6

UNS:-
EN:-

Manufacturing technology of this composites is based on properties of binary system Cu-Ag and variable solubility of silver in copper and copper in silver in the range of solid solutions. Suitable quantity and process sequence of high deformation plastic working and heat treatment type solubility-precipitate allows to obtain wires constituted from Cu and Ag fibers with nanometric cross dimensions and in consequence provide to optimum superposition of high mechanical strength, high electrical conductivity and sufficient ductility of Cu-Ag alloys.

Basic properties

Basic properties	Value	Comments	Literature
Density [g/cm^3]	9,2		[Ref: 656]
Specific heat capacity [J/(kg*K)]	No data		
Temperature coefficient of electrical resistance (0...100°C) [10^{-3}/K]	No data		
Electrical conductivity [T=20°C, (% IACS)]	60-87	Base on the temper	[Ref: 656, 79, 80]
Thermal conductivity [W/(m*K)]	270		[Ref: 656]
Thermal expansion coefficient 20...300°C [10^{-6}/K]	No data		

Applications

Main applications

Conductor materials in pulsed high-field magnets, sheet-conductor, power, signal, diagnostic cables, windings, supply cables, transformers, sheet metal, wires, microwires, materials for electeode used in resistance welding *Literature:* [Ref: 71, 72, 73, 74, 75, 76 , 77, 78, 79, 80, 81, 657]

Kinds of semi-finished products/final products

NO DATA AVAILABLE

Chemical composition

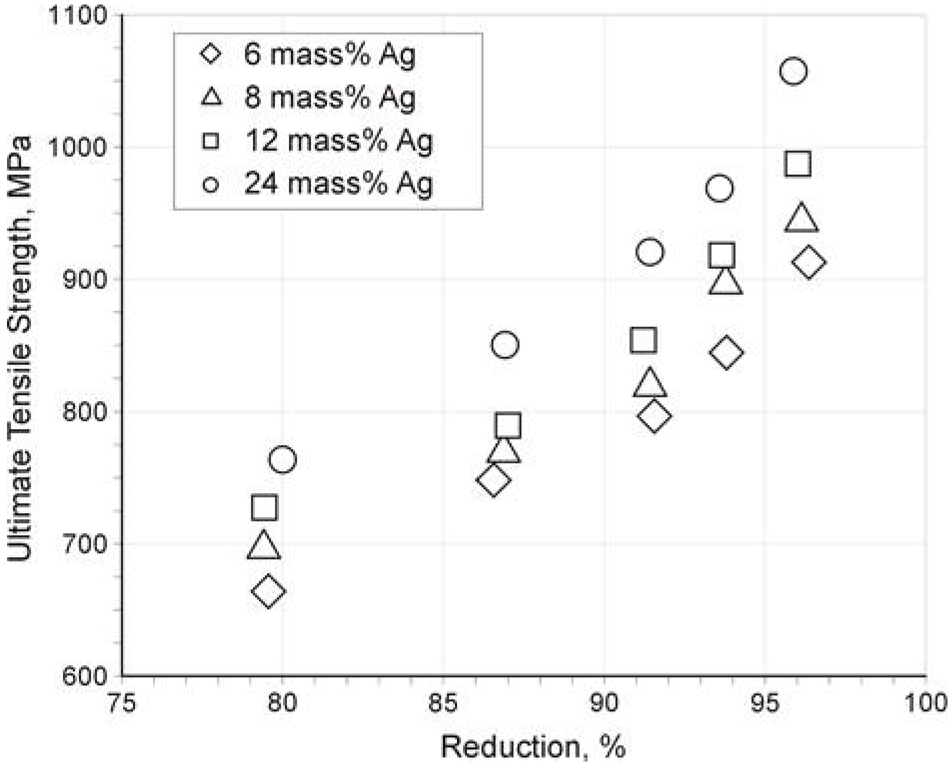
Chemical composition	Value	Comments	Literature
Ag [wt.%]	6	approximate value	
Cu [wt.%]	94	approximate value	

Mechanical properties

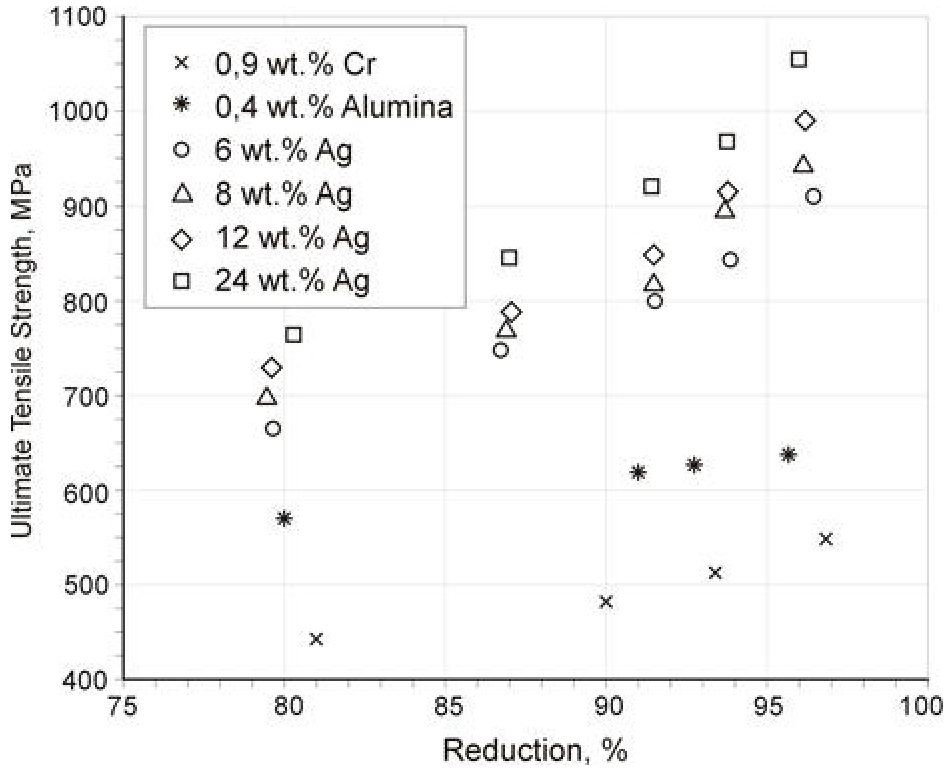
Mechanical properties	Value	Comments	Literature
UTS [MPa]	230-1200	from cast to hard	[Ref: 78, 656]
YS [MPa]	No data		
Elongation [%]	No data		
Hardness	120-195 70-180	[HB] soft - hard [HV] soft - hard	[Ref: 73] [Ref: 656, 659]
Young’s modulus [GPa]	120		[Ref: 656]
Kirchhoff’s modulus [GPa]	No data		
Poisson ratio	No data		

Mechanical properties of CuAg6 alloy [Ref: 660]

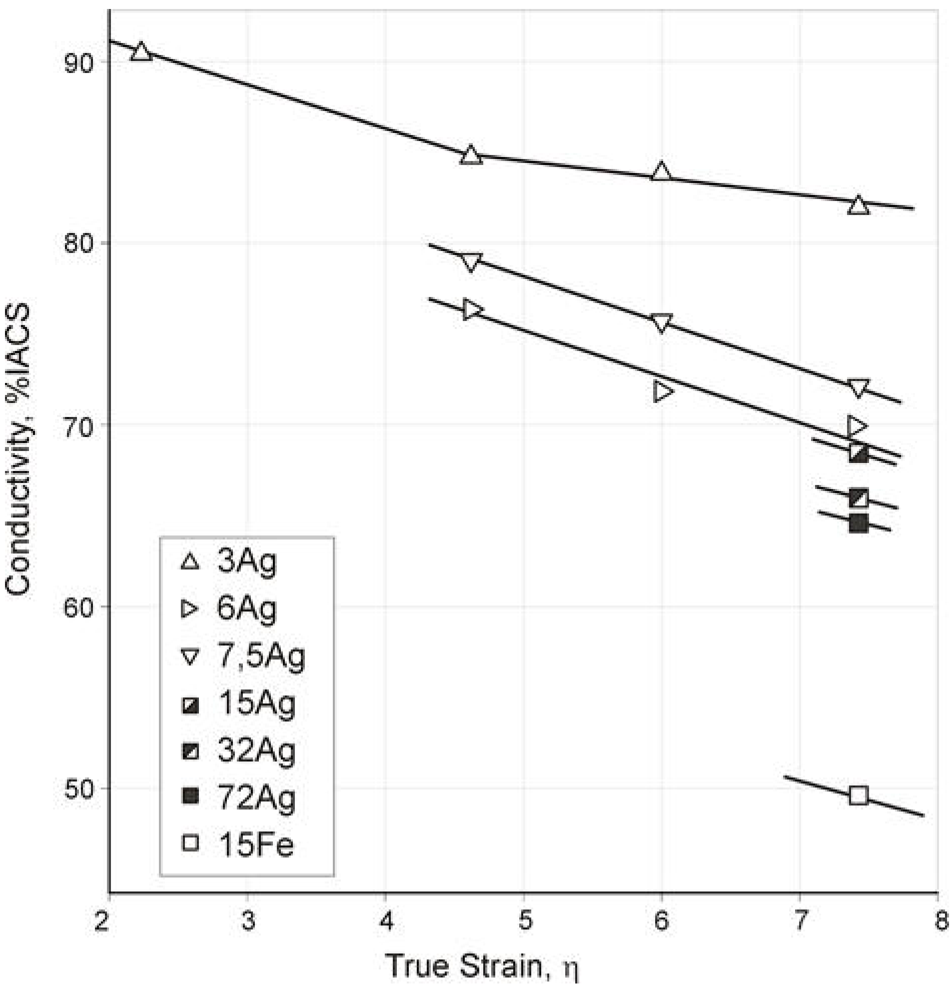
Material	Hardness condition	Tensile strength, MPa	0,2% Yield Strength, MPa	Elongation A50, %	Vickers Hardness HV	Spring bending limit, MPa	Spring fatigue limit, MPa
CuAg6	R320	320-400	≤ 210	30	70-120	460	230
	R400	400-510	³ 330	6	110-150		
	R500	500-660	³ 460	3	145-175		
	R650	³ 650	³ 610	1	³ 175		



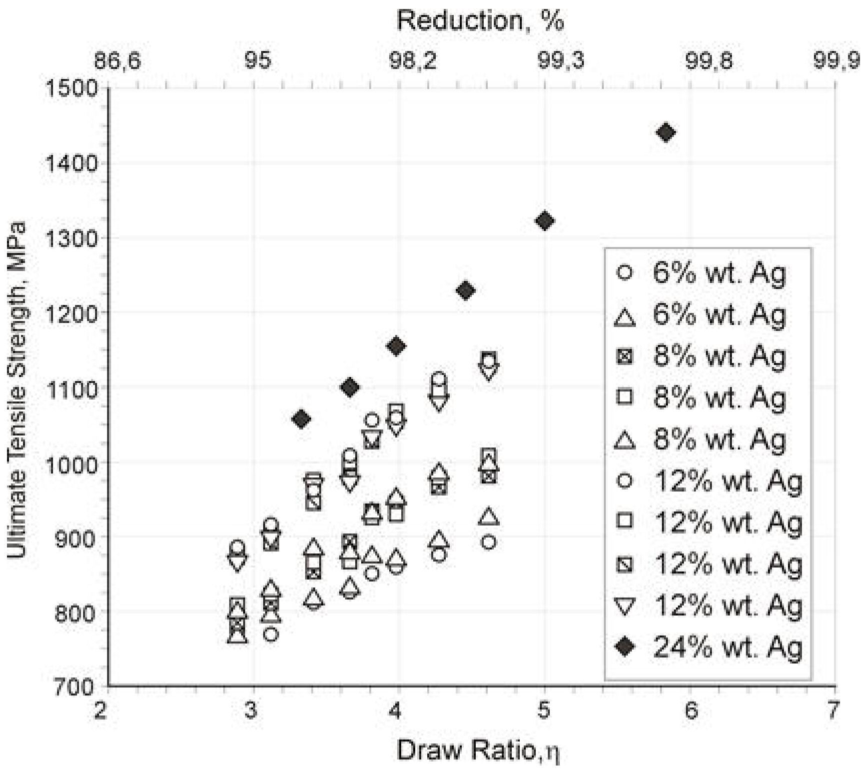
Literature: [Ref: 72]



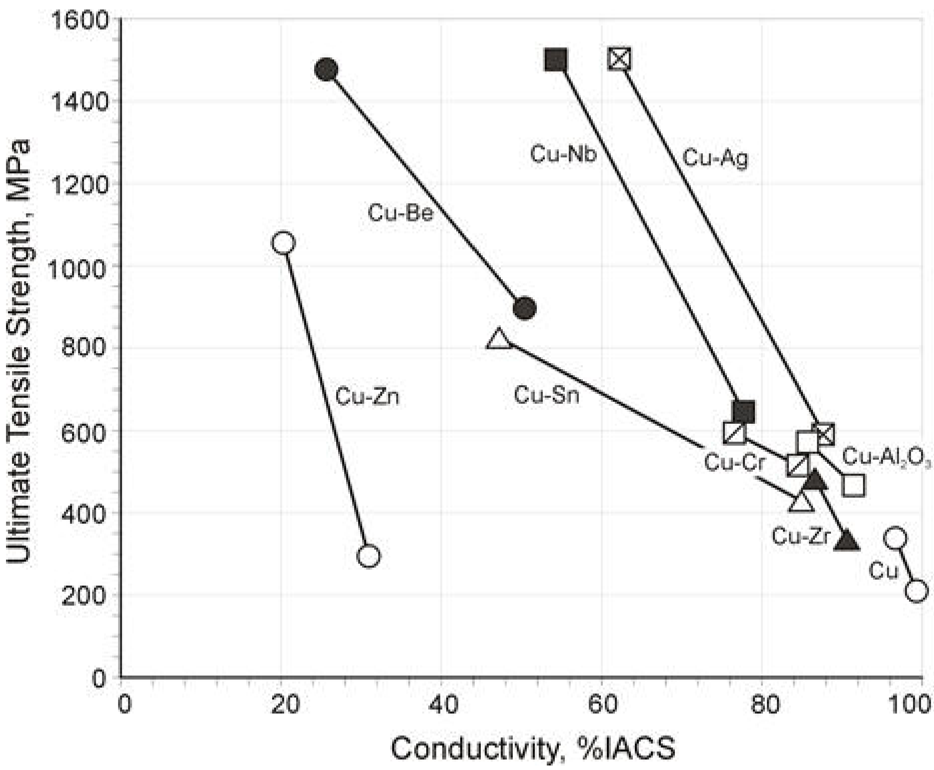
UTS as a function of reduction ratio for the Cu-Ag alloy sheets, with varying Ag content, along with those for Cu-Cr and Cu-alumina alloys [Ref: 81]



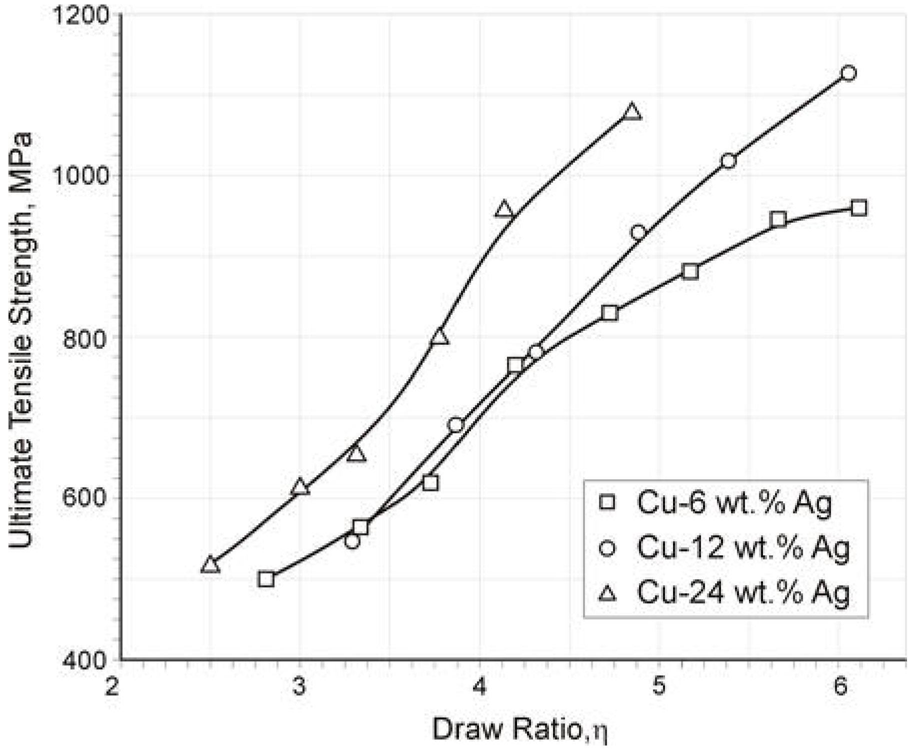
Electrical conductivity (% IACS) on the Cu-Ag alloys as a function of the amount of imposed work (extrusion and wire drawing) [Ref: 81]



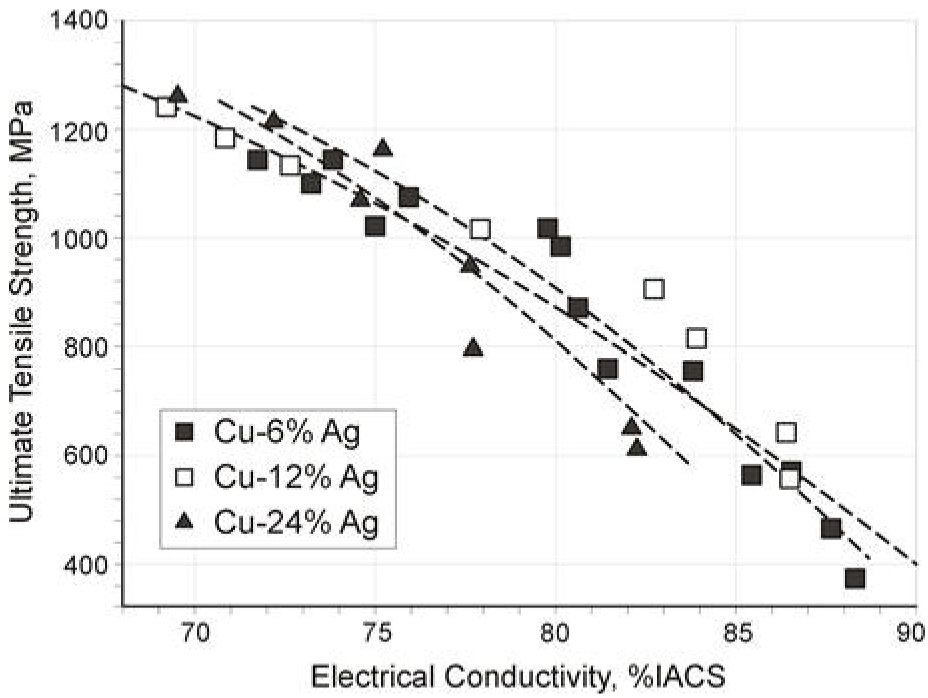
UTS as a function of draw ratio for the Cu-6, 8 and 12 wt% Ag wires made by different method [Ref: 77]



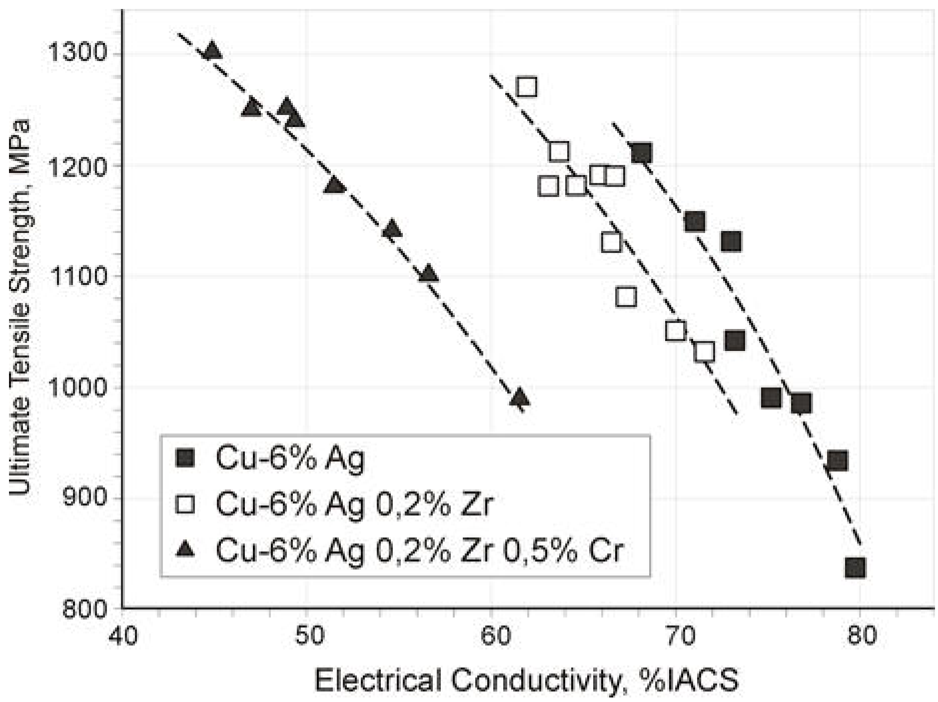
UTS as a function of conductivity for various Cu-based alloys [Ref: 77]



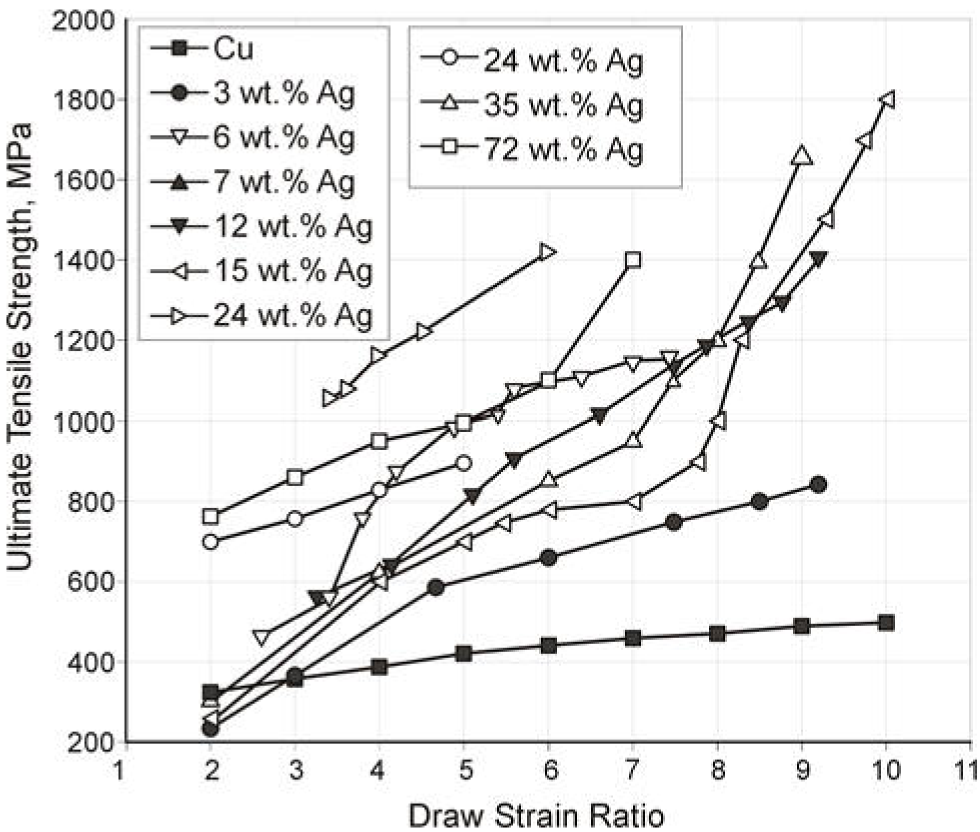
Ultimate tensile strength dependent on draw ratio of the tested CuAg alloys [Ref: 78]



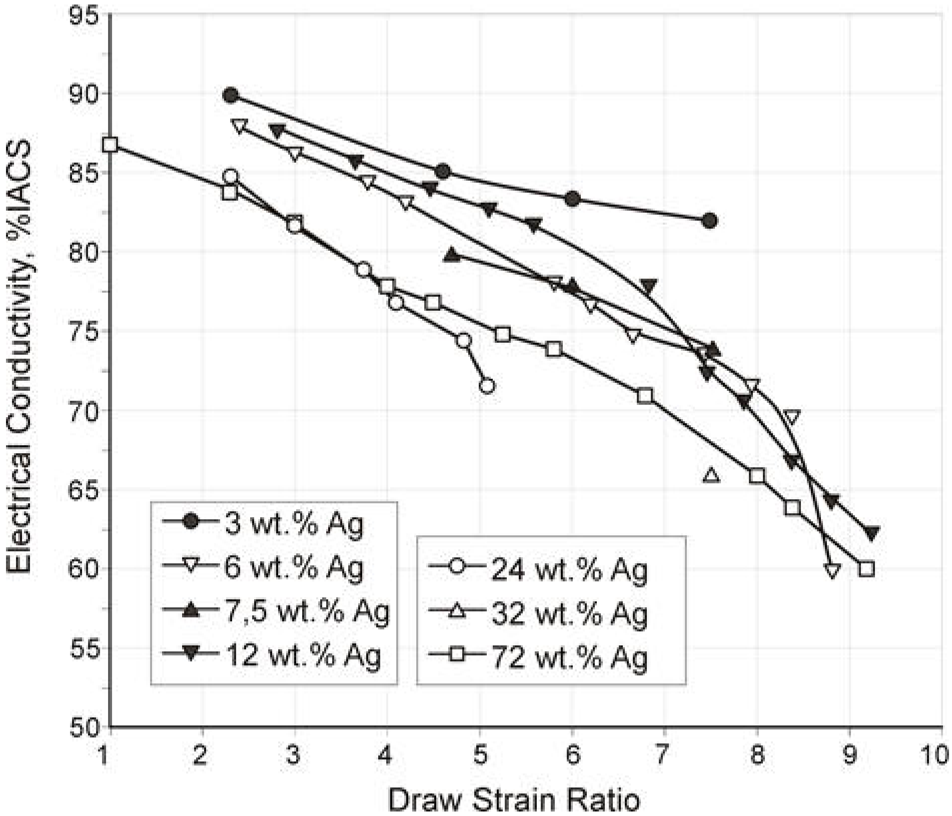
Relationship between the strength and conductivity of the tested CuAg alloys with different Ag content [Ref: 79]



Relationship between the strength and conductivity of Cu6Ag containing different addition [Ref: 78]



Ultimate tensile strength dependent on draw strain in some CuAg alloys [Ref: 80]



Electrical conductivity dependent on draw strain in some CuAg alloys [Ref: 80]

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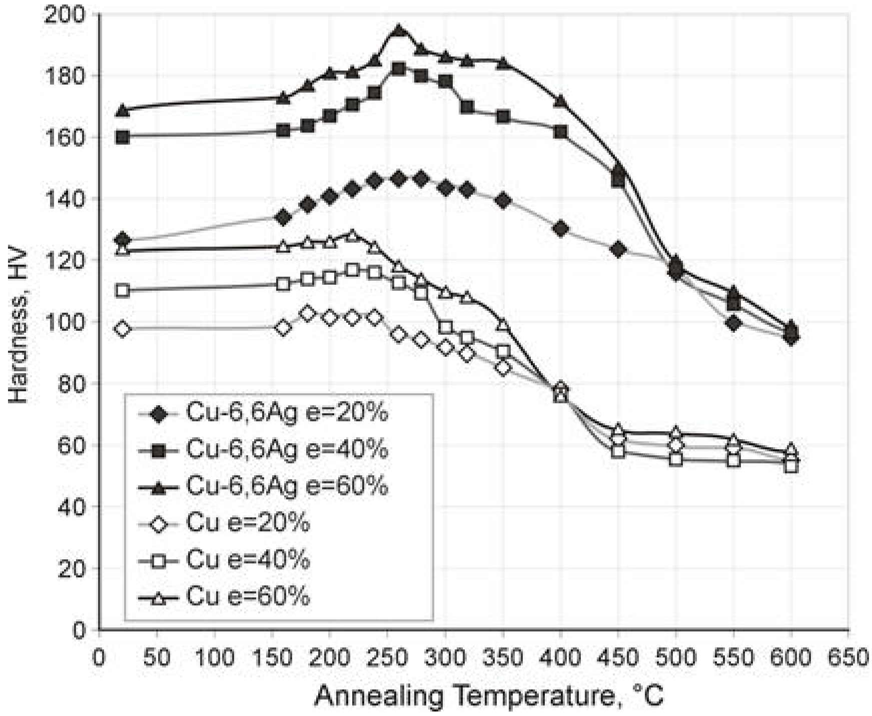
CuAg6	R320	320-400	≤ 210	30	70-120	460	230
	R400	400-510	³ 330	6	110-150		
	R500	500-660	³ 460	3	145-175		
	R650	³ 650	³ 610	1	³ 175		

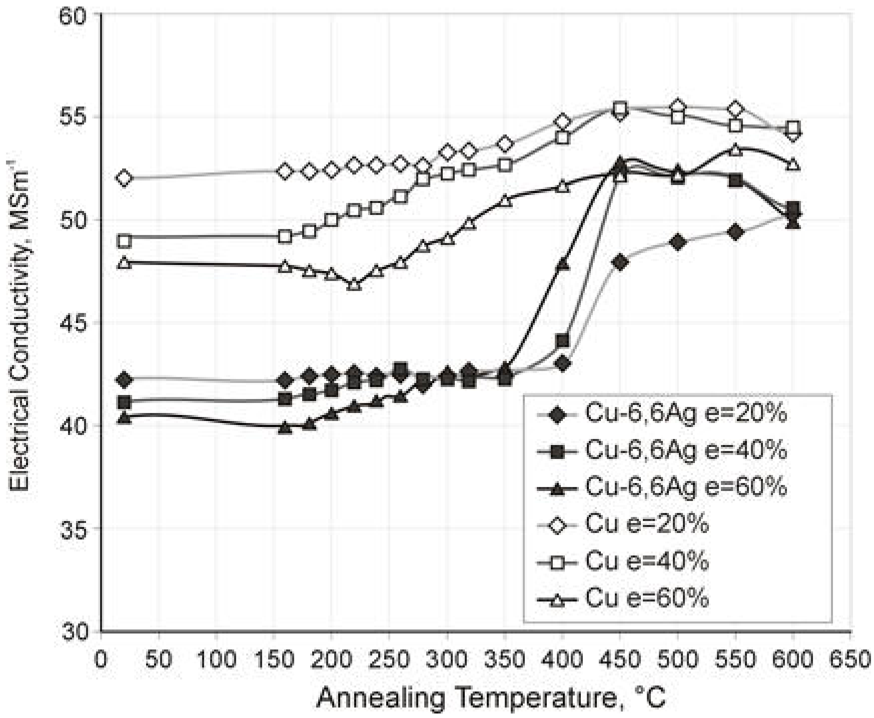
Exploitation properties

Heat resistance

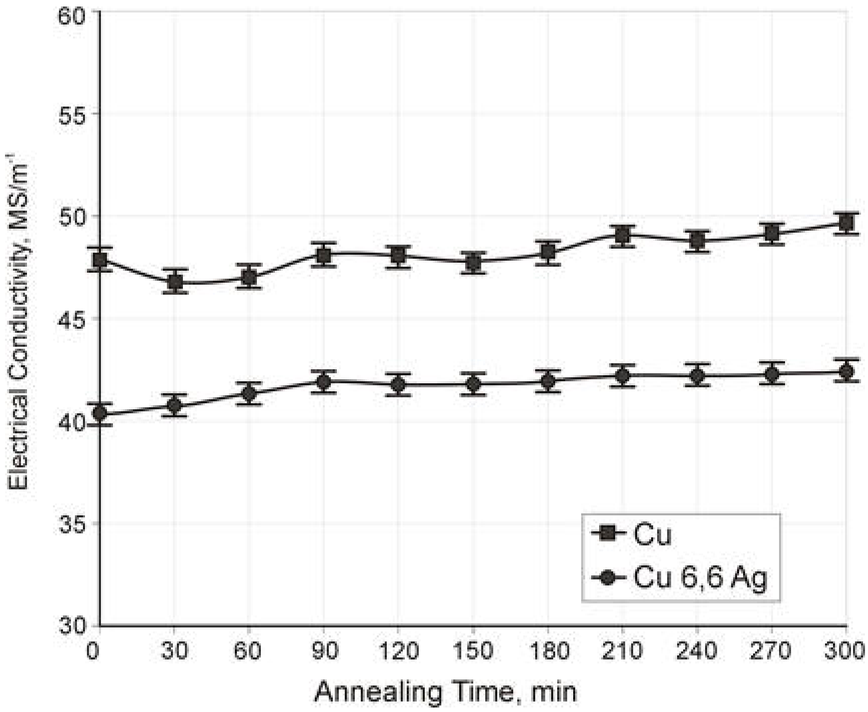
Mechanical and electrical properties vs temperatures



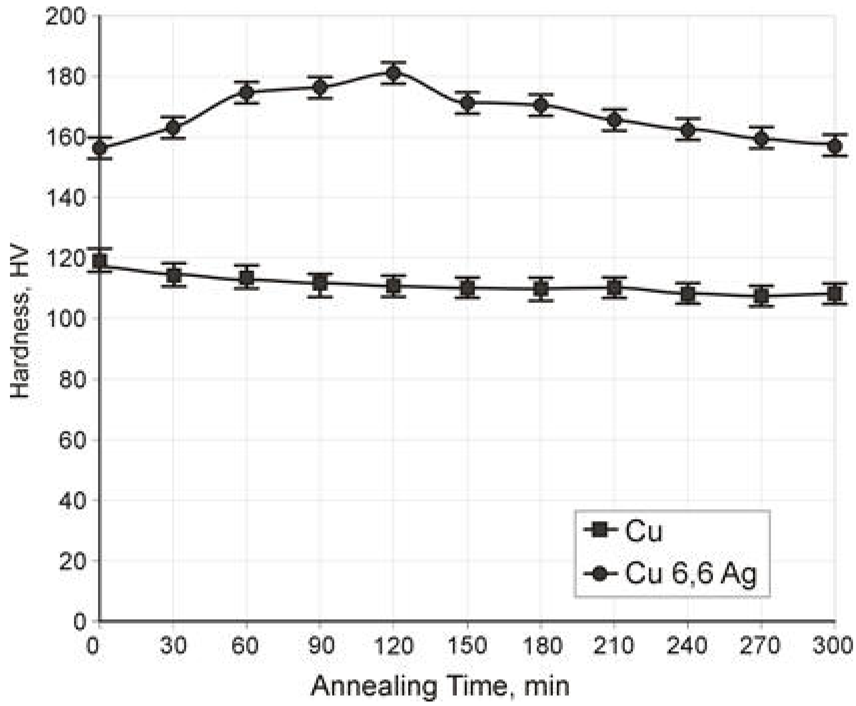
Influence of the annealing temperature on the hardness [Ref: 73]



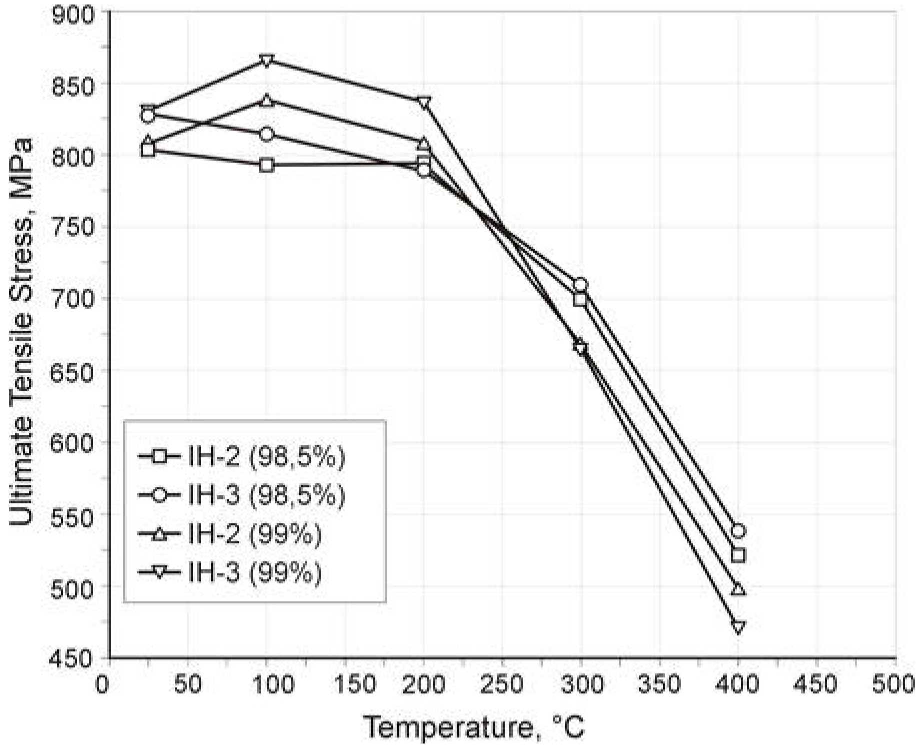
Influence of the annealing temperature on the electrical conductivity [Ref: 73]



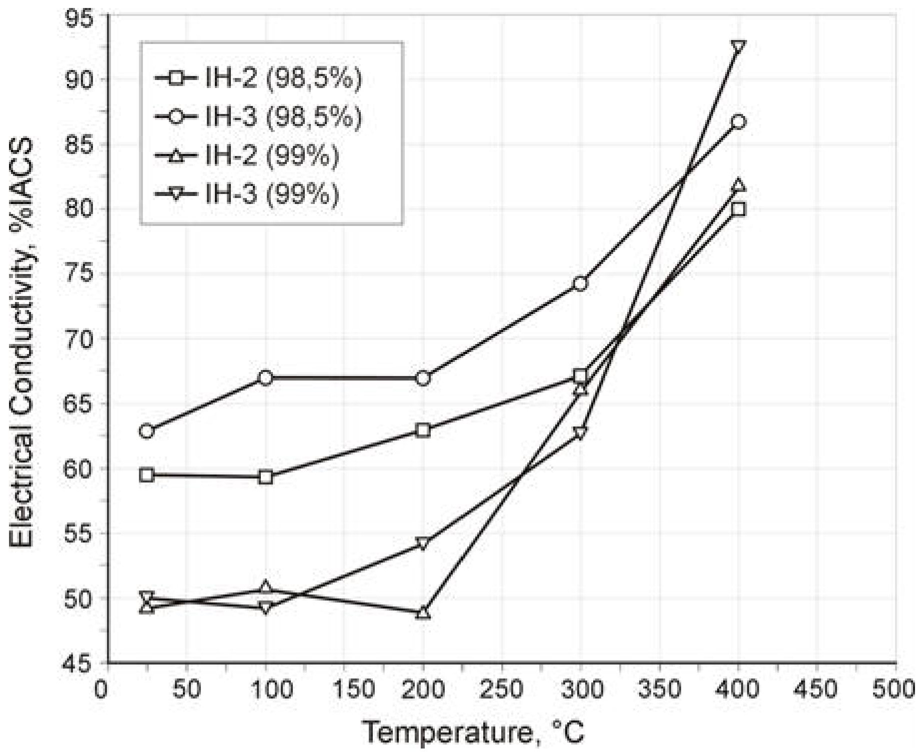
Influence of the annealing time on the electrical conductivity in 60% deformed samples of 260 °C [Ref: 73]



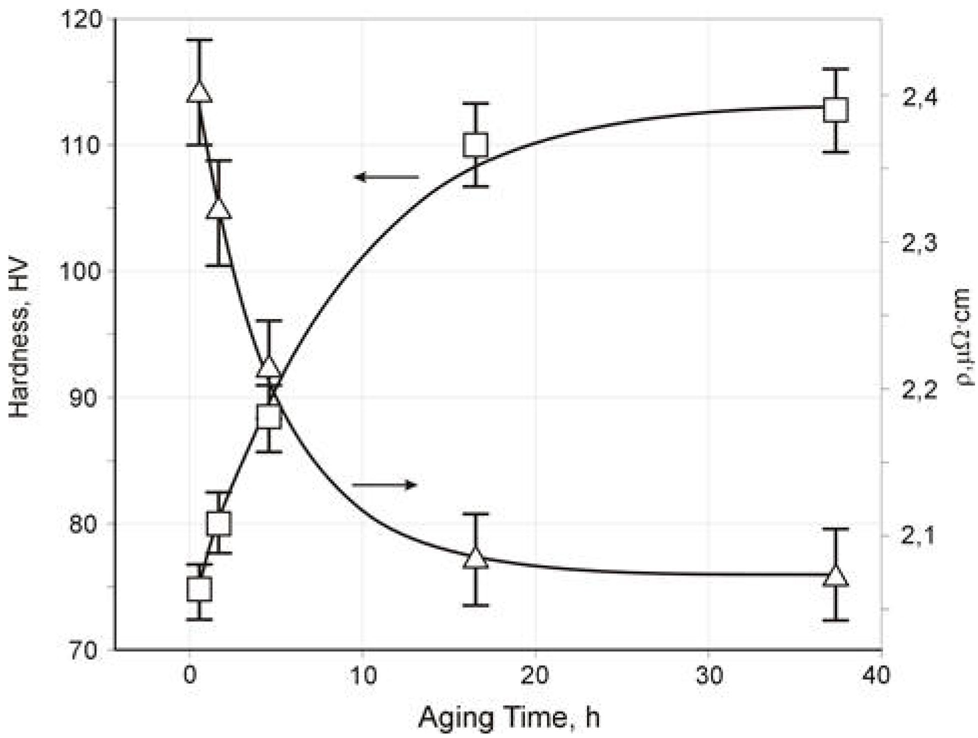
Influence of the annealing time on the hardness in 60% deformed samples at 260 °C [Ref: 73]



Variation in ultimate tensile strength of Cu-6 wt. % Ag alloys (IH-2 and IH-3) after annealing. IH - Intermediate Heat Treatment [Ref: 74]



Variation in electrical conductivity of Cu-6 wt. Ag alloy as a function of aging temperature. IH - Intermediate Heat Treatment [Ref: 74]



Vickers hardness and electrical resistivity of Cu-6 wt.% Ag dependent on aging time at 450°C [Ref: 76]

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

NO DATA AVAILABLE

Half- softening temperature

NO DATA AVAILABLE

Corrosion resistance

Hydrogen embrittlement resistance

NO DATA AVAILABLE

Other kind of corrosion elements

Type of corrosion	Suitability	Literature
Atmospheric	No data	-
Marine environment	No data	-
Stress crack	No data	-
Hydrogen embrittlement	No data	-
Electrolytic	No data	-
Other - oxidising acids	No data	-

Rheological resistance

Stress relaxation

NO DATA AVAILABLE

Creep

NO DATA AVAILABLE

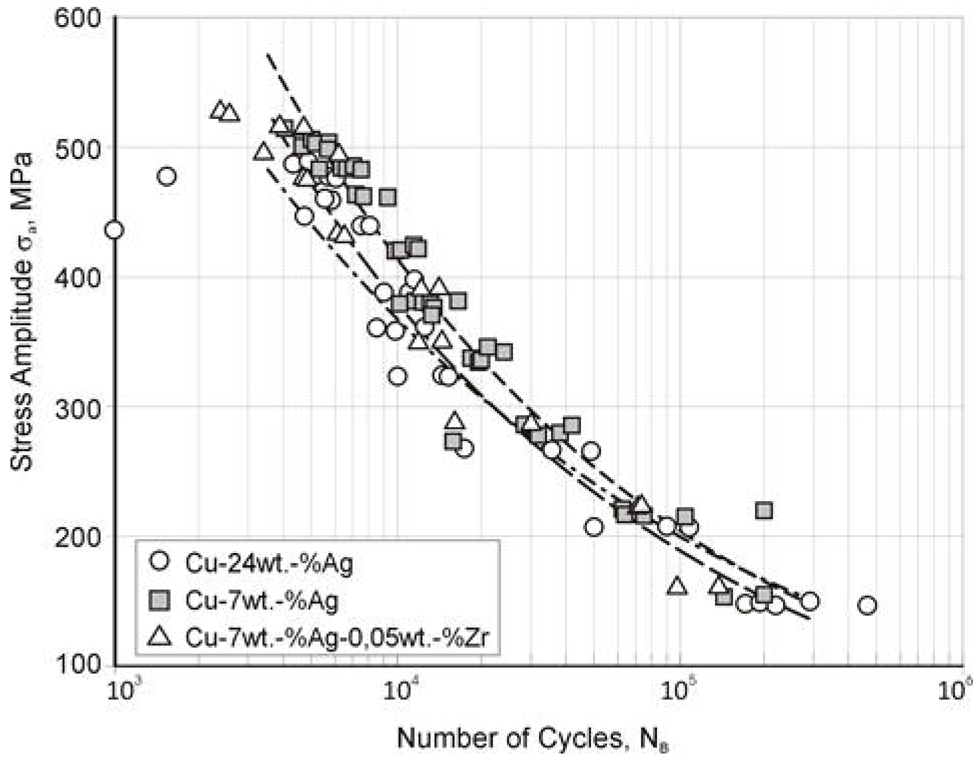
Wear resistance

Friction resistance

NO DATA AVAILABLE

Fatigue resistance

Fatigue cracking



Fatigue life as a function of the stress amplitude of Cu-7 wt.% Ag, Cu-24 wt.% Ag and Cu-7 wt.% Ag-0.05 wt.% Zr, respectively, measured at room temperature and at a stress ratio of R = 0,1 [Ref: 71]

Impact strength

NO DATA AVAILABLE

Fabrication properties

NO DATA AVAILABLE

Technological properties

NO DATA AVAILABLE

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