C42500
CuSn2Zn10

KME Industrial Rolled

Alloy Designation	
EN	
DIN CEN/TS 13388	
NF	(UE39Z)
JIS	C4250
UNS	C42500

High Performance Alloys

We have developed a wide range of high performance alloys with excellent properties regarding conductivity, strength, corrosion behaviour, bend ability and relaxation properties. KME alloys are the first choice materials for high-end applications and products.

Chemical Composition Weight percentage		
Cu	87 … 90	%
Sn	1.5 … 3	%
Zn	Rest	%

This alloy is in accordance with RoHS 2002/96/CE for electric & electronic equipments and 2002/53/CE for automotive industry.

Characteristics

C42500 has excellent cold forming properties, good conductivity combined with high strength and hardness. Corrosion resistance, especially against seawater and industrial atmosphere is good and stress corrosion cracking susceptibility is low. Spring properties are good, so it is used for applications like spring, connectors, contacts.

Main Applications

Automotive Switches and Relays, Contacts, Connectors, Terminals
Electrical Switches and Relays, Contacts, Connectors, Terminals, Components for the electrical industry, Stamped parts,

Preferred Applications

Spring Contact	Switches and Relays	Connector	Current Carrying Capacity
xx	x	xx	x

x = well suited xx = particularly well suited

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.8	g/cm³
Thermal expansion coefficient	20 .. 100 °C	18.3	10^{-6}/K
	20 .. 300 °C	18.4	10^{-6}/K
Specific heat capacity		0.38	J/(g·K)
Thermal conductivity		120	W/(m·K)
Electrical conductivity (1 MS/m = 1 m/(Ω mm²))		15	MS/m
Electrical conductivity (IACS)		25	%
Thermal coefficient of electrical resistance (0 .. 100 °C)		1.0	10^{-3}/K
Modulus of elasticity (1 GPa = 1 kN/mm²) cold formed		110	GPa
annealed		120	GPa

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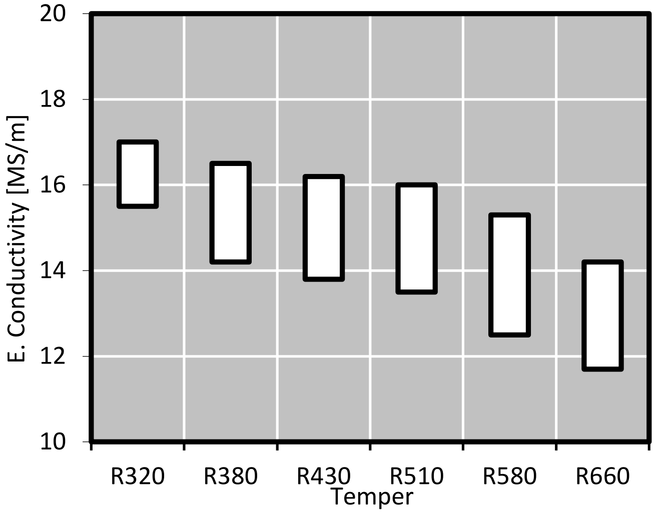
Mechanical Properties (EN 1652)				
Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *
	MPa	MPa	%	HV
R320	320 .. 380	max. 230	25	80 .. 110
R380	380 .. 430	200 *	16	110 .. 140
R430	430 .. 520	330 *	6	140 .. 170
R510	510 .. 600	430 *	3	160 .. 190
R580	580 .. 690	520 *	-	180 .. 210
R660	> 650	610 *	-	> 200

*only for information

Electrical Conductivity



Electrical conductivity is strongly influenced by chemical composition. A high level of cold deformation and small grain size decrease the electrical conductivity moderately. Minimum conductivity level can be specified.

Fabrication Properties*	
Cold Forming Properties Max. 90% between annealings	Excellent
Hot Forming Properties at 790 .. 840°C	Less suitable
Machinability (Rating 30)	Less suitable
Electroplating Properties	Good
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding	Less suitable
Gas Shielded Arc Welding	Excellent
Laser Welding	Excellent
Soft Annealing	425.. 700°C, 1 .. 3h
Stress Relieving Annealing	200 .. 300°C, 1 .. 3h

* For more details call our technical service

Corrosion Resistance*

Resistant to:

Good resistance to atmospheric corrosion due to formation of a protective patina. Cu-OFE has a good resistance in in natural and industrial atmosphere (maritime air too). Corrosion resistance, especially against seawater and industrial atmosphere is good and
C42500 is resistant to industrial and drinking water, aqueous and alkaline solutions (not oxidizing), pure water vapour (steam), non oxidizing acids (without oxygen in solution) and salts, neutral saline solutions.

Stress corrosion cracking susceptibility is low.

Not resistant to:

Oxidising acids, solutions containing cyanides, ammonia or halogens, hydrous ammonia and halogenated gases, hydrogen sulfide.

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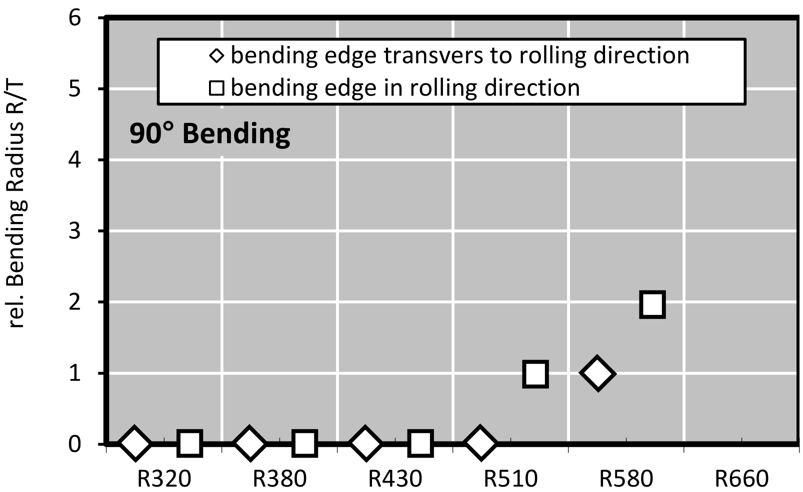
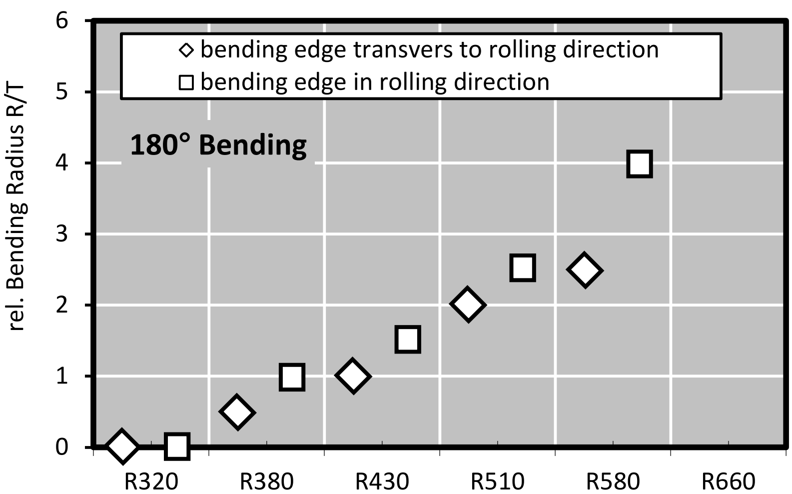
Bending Properties Thickness: ≤ 0.5 mm



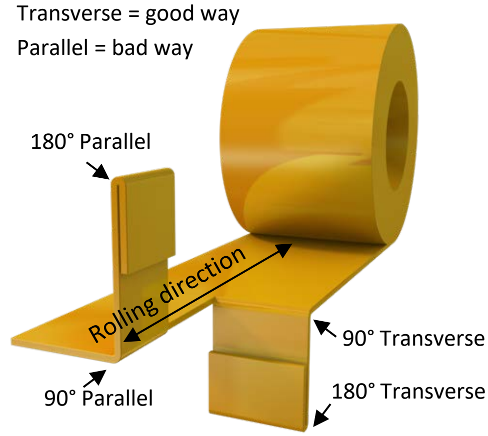


Bending test according to EN ISO 7438 is done with 10 mm wide samples. Smaller samples in general – as well as lower thickness – allow a lower bending radius without cracks. If needed we supply bending optimized temper classes that far exceed standard quality.

Please take care when comparing with ASTM E 290 results, there the bend definition direction is contradictory.

Bending Definition

Transverse = good way
Parallel = bad way



Minimum Bending Radius Calculation

To find out the minimum possible bending radius take the R/T value from the list.

Example: R/T = 0.5 and thickness 0.3 mm

Minimum radius = (R/T) x thickness
= 0.5 x 0.3 mm = 0.15 mm

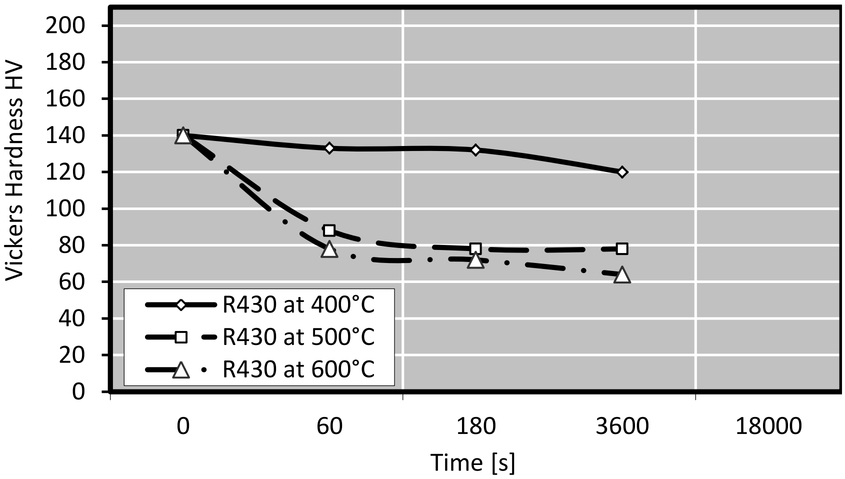
Bending Properties*

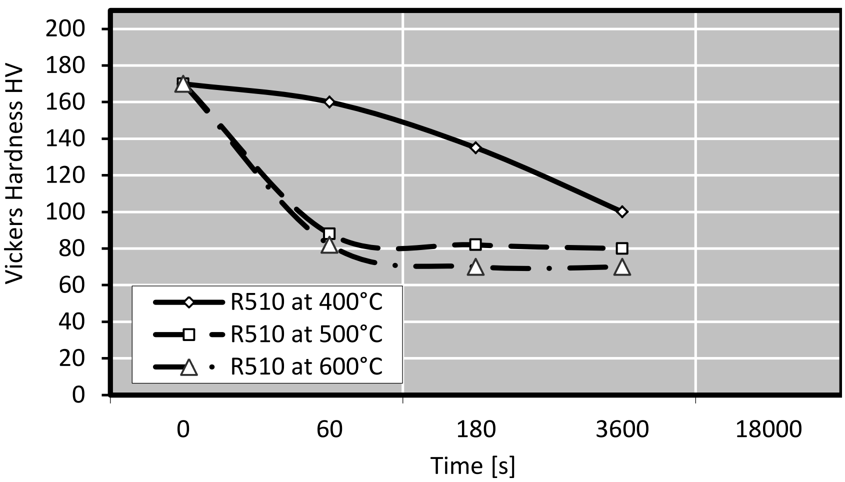
Temper	Thickness Range	Bending 90°		Bending 180°	
		Trans-vers	Parallel	Trans-vers	Parallel
	mm	R/T	R/T	R/T	R/T
R320	≤ 0.5	0	0	0	0
R380	≤ 0.5	0	0	1.5	1
R430	≤ 0.5	0	0	1	1.5
R510	≤ 0.5	0	1	2	2.5
R580	≤ 0.5	1	2	2.5	4
R660	≤ 0.5	-	-	-	-

* Measured at sample width 10 mm according to EN 1654

Possible bending radius = (R/T) x thickness

Softening Resistance





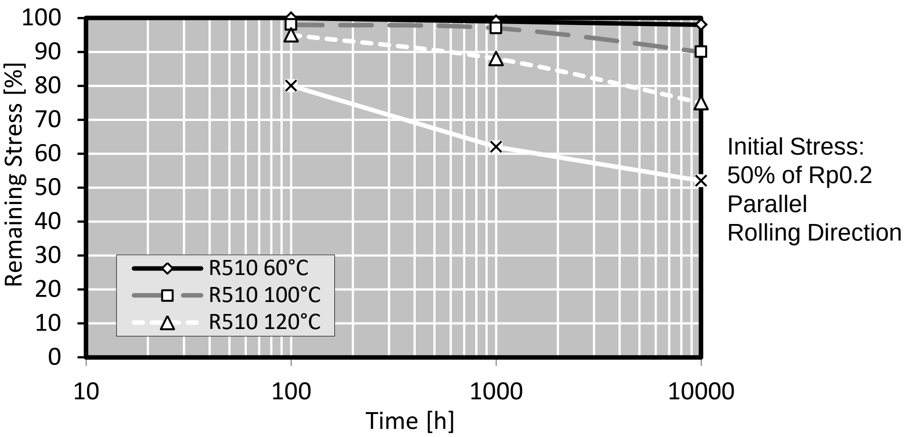
After short time heat treatment Vickers Hardness is measured. The diagram shows typical values.

Bend Fatigue (at room temperature)

The fatigue strength gives an indication about the resistance to variations in applied tension. It is measured under symmetrical alternating load. The maximum bending load for 10^7 load cycles without crack is measured. Dependent on the temper class it is approximately 1/3 of the tensile strength R_m.

Relaxation Properties

Thermal stress relieved



Stress relaxation is tested with cantilever bending test equipment. This method is taking short time relaxation into account. so that the values achieved are very realistic, while other test methods like tube test pretend better properties from the achieved values. Relaxation values give an indication about stress relieve of strip under tension for a certain time and temperature. As it is measured on plain strip. the behaviour of deformed parts may differ. nevertheless the ratio between the different tempers remains the same.

Typical test sample thickness is 0.3 – 0.6 mm.

Standards for copper and copper alloys	
EN 1652	Plate, sheet, strip and circles for general purposes
EN 1654	Strip for springs and connectors
EN 1758	Strip for lead frames
EN 13148	Hot-dip tinned strip
EN 13599	Copper plate, sheet and strip for electrical purposes
EN 14436	Electrolytically tinned strip