

Alloy Designation	C15100
EN	-
DIN CEN/TS 13388	-
UNS	C15100
JAPAN	C 1510 JIS H 3100

Chemical Composition		
Weight percentage		
Cu	≥ 99.80	%
Zr	0.05 .. 0.15	%
Fe	≤ 0.005	%
Mn	≤ 0.005	%
Al	≤ 0.005	%
Fe+Al+Mn	≤ 0.01	%

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

High Performance STOL® Alloys



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

Characteristics

C15100 is a CuZr alloy that can be hardened by cold forming and moderately by precipitation of CuZr - phases during a heat treatment. It has good bendability, excellent hot and cold forming properties, a high strength and a good corrosion resistance.

Due to the low diffusion of Zr in Cu the softening resistance and relaxation properties, even at temperatures up to 150°C are excellent. The electrical and thermal conductivity is excellent. Welding and brazing properties are good, soldering properties are excellent.

The alloy is registered in the US by EPA to have good antimicrobial properties.

Main Applications

Automotive Switches and Relays, Contacts, Connectors, Terminals, Hybrid Cars

Electrical Electronic Circuits, Electrical Connectors, Lead Frames, Switches, Switch Blade Jaws, Commutators for Power, Transmitters, Bases for Power Transmitters, Rectifiers, Soldering and Welding Tips, Circuit Breakers, High Temperature

Preferred Applications

Spring Contact	Switches and Relays	High Temperature Range >150°C	Current Carrying Capacity
xx	xx	xx	xx

x = well suited xx = particularly well suited

Physical Properties

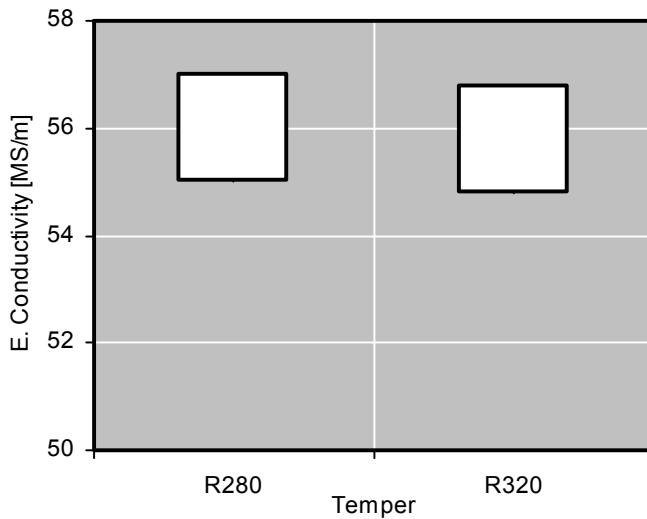
Typical values in annealed temper at 20 °C

Density	8.94	g/cm ³
Thermal expansion coefficient 20 .. 300 °C	17.6	10 ⁻⁶ /K
Specific heat capacity	0.385	J/(g·K)
Thermal conductivity	360	W/(m·K)
Electrical conductivity (1 MS/m = 1 m/(Ω mm ²))	55.1	MS/m
Electrical conductivity (IACS)	95	%
Thermal coefficient of electrical resistance (0 .. 100 °C)	3	10 ⁻³ /K
Modulus of elasticity (1 GPa = 1 kN/mm ²) cold formed	121	GPa

Mechanical Properties (EN 1652)

Temper	Tensile Strength	Yield Strength Minimum	Elongation Minimum	Hardness
	Rm	Rp _{0.2}	A _{50mm}	HV *
	MPa	MPa	%	HV
R280 (H01)	280 .. 310	190	13	
R300 (H02)	300 .. 360	280	6	
R320 (H03)	320 .. 390	310	5	
R360 (H04)	360 .. 430	350	4	
R400 (H06)	400 .. 450	390	3	
R440 (H08)	440 .. 490	430	2	

*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	Excellent
Machinability (Rating 20)	Less suitable
Electroplating Properties	Good
Hot Tinning Properties	Good
Soft Soldering, Brazing	Excellent
Resistance Welding	Less suitable
Gas Shielded Arc Welding	Less suitable
Laser Welding	Fair

* For more details call our technical service

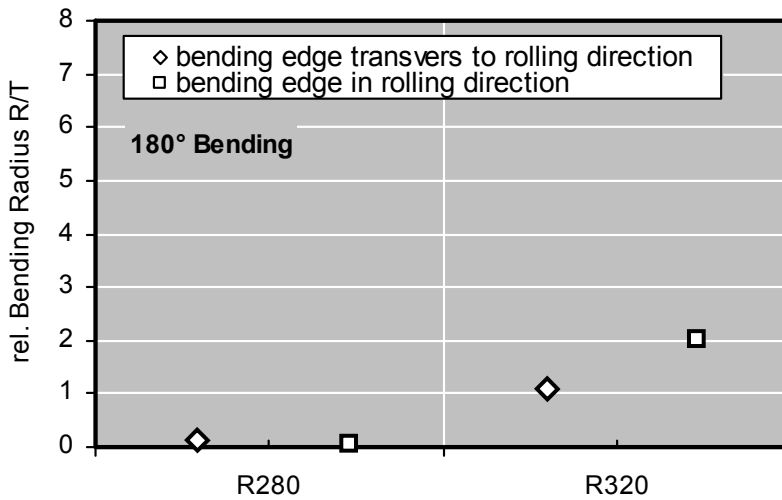
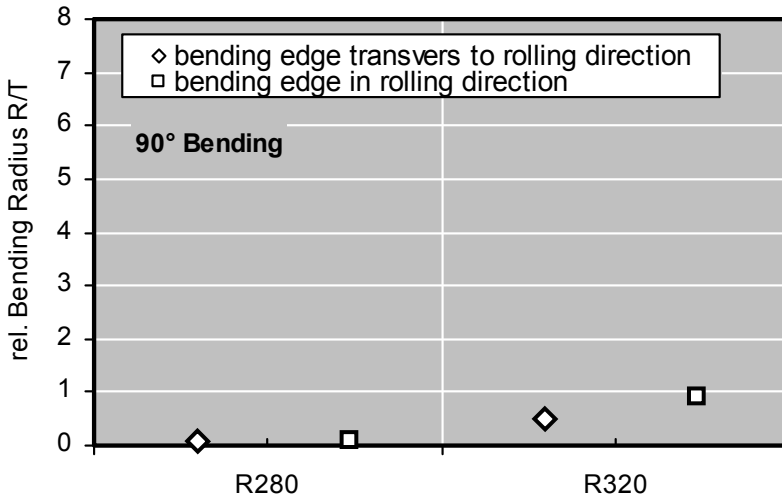
Corrosion Resistance*

C15100 is resistant to pure water vapour and non oxidizing acids and alkalis as well as neutral saline solutions.

The material is insensitive to stress corrosion cracking.

* For more details call our technical service

Bending Properties Thickness: ≤ 0.5 mm

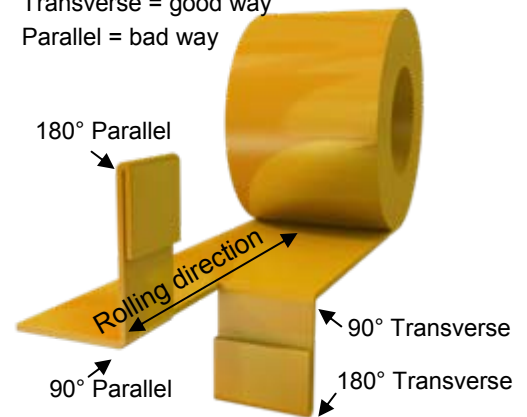


Bending test according to EN ISO 7438 is done with 10 mm wide samples. Smaller samples in general – as well as lower thickness – allow a lower bending radius without cracks. If needed we supply bending optimized temper classes that far exceed standard quality.

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
R280	≤ 0.5	0	0	0.5	1
R320	≤ 0.5	0	0	1	2

* Measured at sample width 10 mm according to EN 1654
Possible bending radius = (R/T) x thickness

Sanitary and Antimicrobial Properties



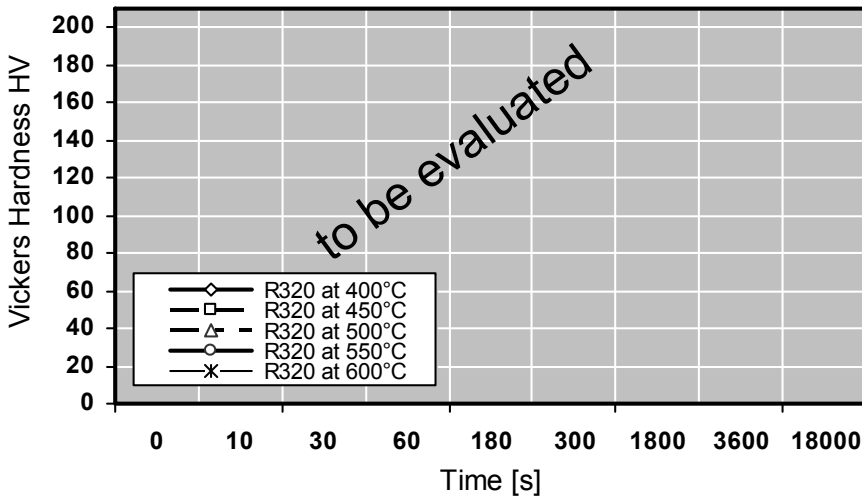
Copper has been recognised as a hygienic material since the dawn of civilisation and, in the last two centuries, the anecdotal evidence has been supported by scientific research showing that copper is antimicrobial, i.e. it inhibits the growth of harmful pathogens - bacteria, moulds, algae, fungi and viruses.

Due to its high copper content of about 99.8% C15100 provides the full antimicrobial properties of copper to inhibit the growth of bacteria, viruses and fungi which are in contact for a short period of time on copper containing surfaces.

Copper surfaces have sanitizing properties and self-sanitizing activity that make it attractive for hygienic and sanitary use e.g. in hospitals, nursing homes and other healthcare facilities or public buildings. The effect has been verified in recent scientific studies on a range of disease-causing organisms including *MRSA*, *Clostridium difficile*, *E.coli*, *Listeria monocytogenes*, *Influenza A (H1N1)* and *Aspergillus niger*.

Picture: Copper coin (Irish penny) on an agar plate with cells of *E. coli* bacteria. For more details please contact our technical service

Softening Resistance



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

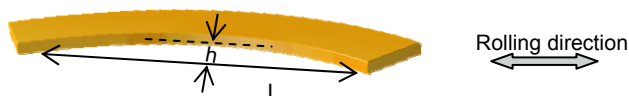
Bend Fatigue (at room temperature)

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 .

C15100

Industrial Rolled

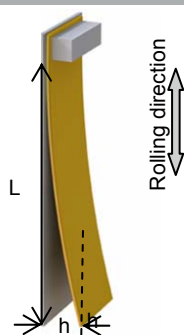
Camber



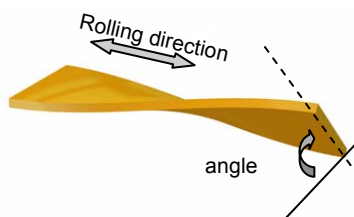
Evenness



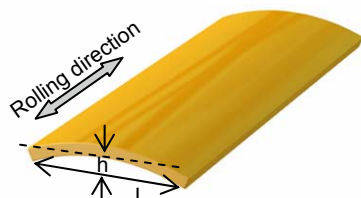
Coil set



Twist



Transverse Flatness



Evenness Tolerance

Thickness Range [mm]	Width Range [mm]		
	7 .. 20	21 .. 50	51 .. 100
0.10 .. 0.50	+0.10	+0.20	+0.30
0.50 .. 1.00	+0.15	+0.25	+0.35

Width Tolerance Standard / Precision

Thickness Range [mm]	Width Range [mm]					
	10 .. 50	51 .. 100	101 .. 200	201 .. 350	351 .. 700	700 .. 1.250
0.10 .. 1.00	+0.2 / +0.1	+0.3 / +0.2	+0.4 / +0.3	+0.6 / +0.4	+1.0 / +0.5	-
0.20 .. 1.00	+0.2 / +0.1	+0.3 / +0.2	+0.4 / +0.3	+0.6 / +0.4	+1.0 / +0.5	+2.0
1.01 .. 2.00	+0.3 / +0.2	+0.4 / +0.2	+0.5 / +0.4	+1.0 / +0.6	+1.5 / +0.7	+2.0
2.01 .. 3.00	+0.5 / +0.3	+0.6 / +0.3	+0.7 / +0.5	+1.2 / +0.7	+2.0 / +0.9	+3.0
3.01 .. 6.00	+2.0 / -	+2.3 / -	+2.5 / -	+3.0 / -	+4.0 / -	+6.0

Customized Tolerances





Our products are produced in accordance with relevant norms EN 1652 / EN 1654. Customer specific tolerances for Thickness, Width, Camber, Transverse Flatness, Evenness, Twist and Coil set can be defined. We will be happy to meet your demands. EN 1652 defines only camber.

Thickness Tolerance

Thickness Range [mm]	EN 1652 ≤350 mm [mm]	KME Standard [mm]	KME Precision [mm]
0.10 .. 0.20	± 0.018	± 0.005	± 0.004
0.21 .. 0.30	± 0.022	± 0.007	± 0.005
0.31 .. 0.40	± 0.025	± 0.015	± 0.006
0.41 .. 0.50	± 0.030	± 0.015	± 0.008
0.51 .. 0.60	± 0.040	± 0.017	± 0.010
0.61 .. 0.70	± 0.040	± 0.020	± 0.010
0.71 .. 0.85	± 0.040	± 0.022	± 0.012
0.86 .. 1.30	± 0.050	± 0.025	± 0.015
1.31 .. 2.00	± 0.060	± 0.030	± 0.020
2.01 .. 3.00	± 0.070	± 0.045	± 0.025
3.00 .. 4.00	± 0.100	± 0.050	± 0.025
4.00 .. 6.00	± 0.120	± 0.060	± 0.030

Roughness

Ra [μm]	Thickness [mm]
0.13 .. 0.18	0.1 .. 2.0
0.20 .. 0.30	0.1 .. 2.0
0.35 .. 0.46	0.1 .. 2.0
On request	> 2.0

Formats	Dimension*		
	Coil	Strip thickness (other thicknesses on request) Strip width Outside diameter Weight (Standard) Weight (Deep-Drawing Quality) Weight per mm	$\geq 0.1 \dots 6.00$ mm $\geq 3 \dots 1.250$ mm ≤ 1.400 mm ≤ 8.400 kg ≤ 8.000 kg ≤ 12.0 kg
	Traverse wound strip	Thickness Width Weight Drums: wood, plastic, metal, flangeless	$\geq 0.2 \dots \leq 1.50$ mm $\geq 8 \dots \leq 60.0$ mm 300 .. 1.500 kg
	TECSTRIP® _multicoil	Thickness Width Inner diameter 300 mm for thickness Inner diameter 400 mm for thickness Maximum weight Outer diameter maximum	$0.18 \dots 0.80$ mm 15 .. 50 mm $0.15 \dots 0.80$ mm $0.41 \dots 0.80$ mm 5.000 kg 1.600 mm
	Sheet ≤ 6.35 mm	Thickness Width Length Weight Sheets in standard dimensions e.g. 1,000 x 2,000 mm	$0.3 \dots 6.35$ mm 50 .. 1.250 mm 200 .. 6.500 mm 2.800 .. 8.000 kg
	Sheet > 6.35 mm	Thickness Width Length Weight Sheets in standard dimensions e.g. 1,000 x 2,000 mm	$6.35 \dots 9.50$ mm 50 .. 2.450 mm 200 .. 7.500 mm ≤ 10.000 kg
	Plate	Thickness Width Length Weight	$9.5 \dots 150$ mm ≤ 4.500 mm ≤ 15.000 mm ≤ 8.000 kg
	Disc	Thickness Diameter Weight	$0.3 \dots 150$ mm $20 \dots 3.100$ mm ≤ 10.000 kg

* Some combinations might not be possible

Surface coatings & Special Treatments *		Dimension	
	Hot-Dip tinned and STOL®28M Tin-Silver STOL®13 Thermic Sn	Width Thickness Tin Layer Thickness	≤ 330 mm ≤ 1.5 mm 0.4 .. 20 μm
	Different thickness per side possible		
	Electroplating	Width Thickness	≤ 400 mm ≤ 2.5 mm
	Tin, Silver, Gold, Cu-Flash, Ni-Flash, Selective plating	Other coatings on request	
	Profiled strips STOL®Multigauge	Width Thickness	15 .. 90 mm 0.23 .. 1 mm
	Other width on request		
	Surface with extra low residual carbon content possible.		
	Protection with oil or adhesive foil on request		

* Further details you find at www.kme.com

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

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