


Alloy Designation	KME 100
EN	Cu-ETP (E-Cu, E-Cu58)
DIN CEN/TS 13388	CW004A
JIS	C 1100
UNS	C11000

Chemical Composition		
Weight percentage		
Cu	≥ 99.90	%
O	0.005 .. 0.040	%

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

**Copper Rolled Products**



We produce a vast assortment of copper rolled products with highest purity in various in chemical compositions, sizes and formats, all suited to many types of final processing.

**Characteristics**

Cu-ETP is an oxygen containing copper which has a very high electrical and thermal conductivity. It has excellent forming properties. Due to its oxygen content soldering and welding properties are limited. The alloy is registered US EPA antimicrobial.

**Main Applications**

- Automotive** Radiators, Gaskets
- Builders Hardware** Cotter Pins, Butts, Ball Floats, Nails, Tacks, Soldering Copper, Rivets
- Consumer** Christmas Ornaments
- Electrical** Transformer Coils, Switches, Terminals, Contacts, Radio Parts, Busbars, Terminal Connectors, Conductors, Stranded Conductors, Cable Strip
- Fasteners** Fasteners
- Industrial** Printed circuit boards, Stamped parts, Pressure Vessels, Chemical Process Equipment, Chlorine Cells, Chimney Cap Screens, Heat Exchangers, Printing Rolls, Anodes, Rotating Bands, Kettles, Pans, Vats, Heat sinks

**Preferred Applications**

Transformer	Fuse; Relay Box; Punshed Screen	Cable Strip	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	8.9	g/cm <sup>3</sup>
Thermal expansion coefficient	-191 .. 16 °C	14.1
	0 .. 300 °C	17.7
Specific heat capacity	0.386	J/(g·K)
Thermal conductivity	394	W/(m·K)
Electrical conductivity (1 MS/m = 1 m/(Ω mm <sup>2</sup> ))	≥ 58	MS/m
Electrical conductivity (IACS)	100	%
Thermal coefficient of electrical resistance (0 .. 200 °C)	3.7	10 <sup>-3</sup> /K
Modulus of elasticity ( 1 GPa = 1 kN/mm <sup>2</sup> ) cold formed	130	GPa
	annealed	127
		GPa

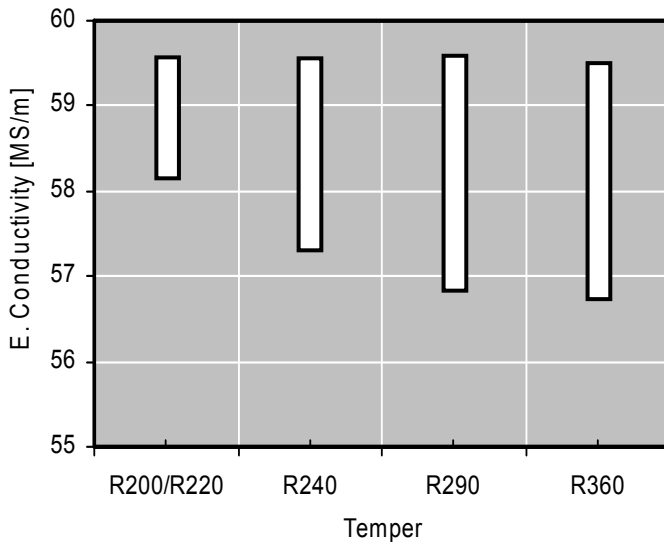


**Mechanical Properties (EN 1652)**

Temper		Tensile Strength	Yield Strength	Elongation Minimum	Hardness
		R <sub>m</sub>	R <sub>p0.2</sub>	A <sub>50mm</sub>	HV *
		MPa	MPa	%	HV
R220	annealed	220 .. 260	< 140*	33	40 .. 65
R240		240 .. 300	≥ 180	8	65 .. 95
R290		290 .. 360	≥ 250	4	90 .. 110
R360		≥ 360	≥ 320	2	≥ 110

\* 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
Hot Forming Properties at 750 .. 950°C	Good
Machinability (Rating 20)	Less suitable
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft soldering	Excellent
Resistance Welding	Less suitable
Gas Shielded Arc Welding	Less suitable
Laser Welding	Less suitable
Soft Annealing	250 .. 500°C
Stress Relieving Annealing	150 .. 200°C

During heating in reducing atmosphere hydrogen can penetrate inside the copper and react with Cu-Oxide to water vapour. Its pressure can cause embrittlement.

**Corrosion Resistance\***

Resistant to:

Atmospheric corrosion: formation of the a greenish protective patina due to the formation of copper basic salts (such sulphates, chlorides in marine environment, nitrates and carbonates). Cu-ETP is showing a good resistance in in natural atmosphere.

Industrial and drinking water, aqueous and alkaline solutions (excluding aqueous solutions containing cyanides, halogens, ammonia), pure water vapour (steam), non oxidizing acids (without oxygen in solution), neutral saline solutions.

Material can be heat-treated in reducing atmosphere.

Practically resistant against stress corrosion cracking

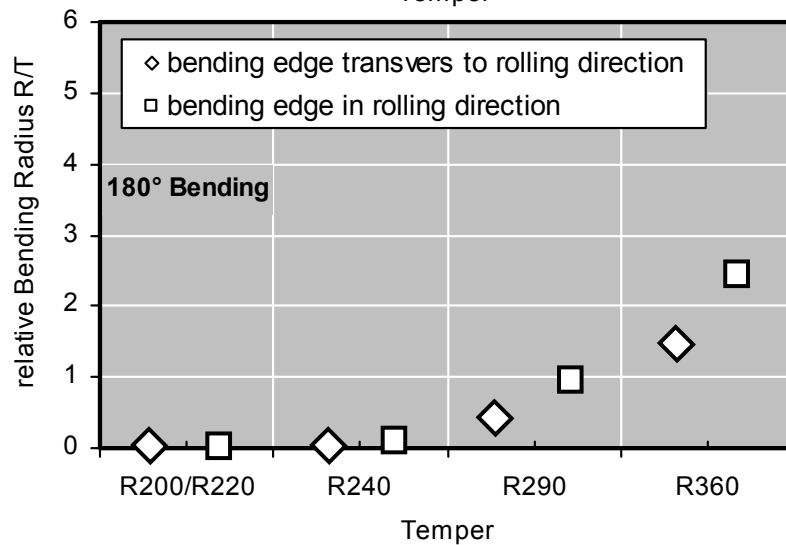
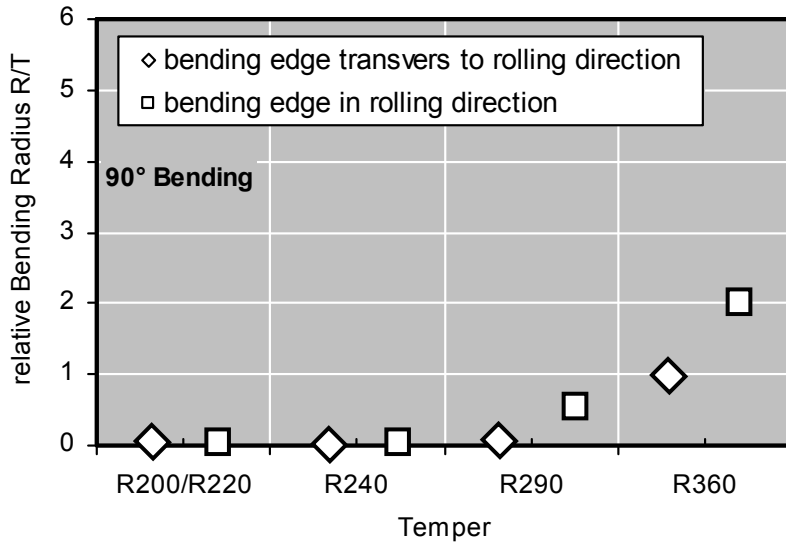
Not resistant to:

Oxidising acids, solutions containing cyanides, ammonia or halogens, hydrosulfide, seawater.

\* For more details call our technical service



**Bending Properties**      Thickness: ≤ 0.5 mm

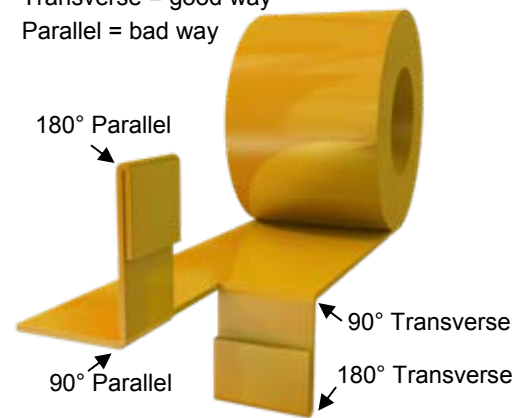


Bending test according to EN ISO 7438 is done with 10 mm wide samples. Smaller samples in general – as well as lower thickness – allow a lower bending radius without cracks. If needed we supply bending optimized temper classes that far exceed standard quality.

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°	
		Transvers	Parallel	Transvers	Parallel
	mm	R/T	R/T	R/T	R/T
R220	≤ 0.5	0	0	0	0
R240	≤ 0.5	0	0	0	0
R290	≤ 0.5	0	0.5	0.5	1
R360	≤ 0.5	1	2	1.5	2.5

**Bending of 5 mm thickness**

Bending test with R240 in 5 mm thickness showed crack free bending at R/T ≥ 0.35 for 90° and 180° bending in parallel and transverse direction.

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



Sanitary and Antimicrobial Properties

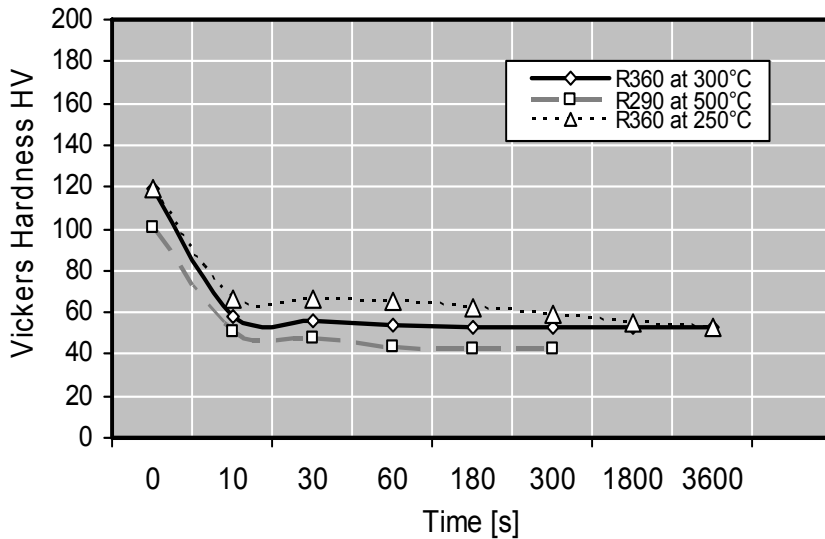


Copper has been recognised as a hygienic material since the dawn of civilisation and, in the last two centuries, the anecdotal evidence has been supported by scientific research showing that copper is antimicrobial, i.e. it inhibits the growth of harmful pathogens - bacteria, moulds, algae, fungi and viruses. Due to its high copper content of about 99% Cu-ETP 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



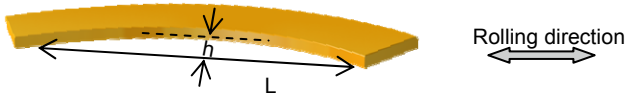
After short time heat treatment Vickers Hardness is measured. The diagram shows typical values.

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  $R_m$ .



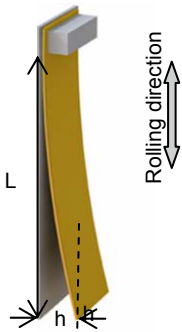
**Camber**



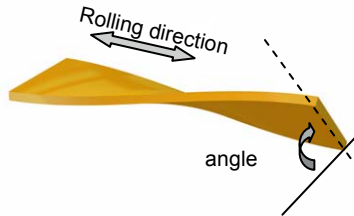
**Evenness**



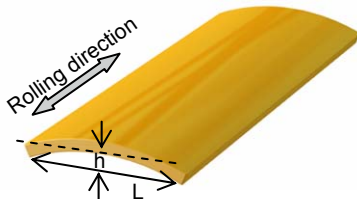
**Coil set**



**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]						* Only R220 and R220
	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	≥ 0.1 .. 6.00 mm ≥ 3 .. 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	≥ 0.2 .. ≤ 1.50 mm ≥ 8 .. ≤ 60.0 mm 300 .. 1,500 kg
	<b>TECSTRIP®</b> _multicoil	Thickness Width Inner diameter 300 mm for thickness Inner diameter 400 mm for thickness Maximum weight Outer diameter maximum	0.18 .. 0.80 mm 15 .. 50 mm 0.15 .. 0.80 mm 0.41 .. 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 on stock	0.3 .. 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 .. 9.50 mm 50 .. 2,450 mm 200 .. 7,500 mm ≤ 10,000 kg
	Plate	Thickness Width Length Weight	9.5 .. 150 mm ≤ 4,500 mm ≤ 15,000 mm ≤ 8,000 kg
	Disc	Thickness Diameter Weight	0.3 .. 150 mm 20 .. 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	≤ 330 mm
		Thickness	≤ 1.5 mm
		Tin Layer Thickness	0.4 .. 20 µm
	Different thickness per side possible	R360 on request	
	Electroplating	Width	≤ 400 mm
		Thickness	≤ 2.5 mm
	Tin, Silver, Gold, Cu-Flash, Ni-Flash, Selective plating	Other coatings on request	
	Profiled strips STOL®Multigauge	Width	15 .. 90 mm
		Thickness	0.23 .. 1 mm
		Other width on request	
	Deburred and rounded edges	Width	≥ 200 .. 1,250* mm
		Thickness	0.3 .. 2.0* mm
	(e.g. for Transformer Strips)	* 0.3 - 2.0 mm Width ≤ 700 mm and 0.4 - 2.0 mm Width ≥ 700 mm	
	Surface with extra low residual carbon content possible.		
	Protection with oil or adhesive foil on request		

\* Further details you find at our website.

#### 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



**Contact** (alphabetic order per country)

AUSTRIA	FRANCE	SINGAPORE
KME Austria Vertriebsgesellschaft m.b.H Postfach 128 1232 Wien Phone + 43-1-6 16 79 86-0 Fax + 43-1-6 16 79 86-36 E-Mail info-at@kme.com	KME France S.A.S. 11 bis. rue de l'Hôtel de Ville 92411 Courbevoie Cedex Phone + 33 1 478 96-868 Fax + 33 1 466 71-212 E-Mail info@kme.com	KME Asia Pte. Ltd. 51 Lorong 17 Geylang #06-01 Superior Industrial Building Singapore 388571 Phone + 65-63 37 86 71 Fax + 65-67 48 22 34 E-Mail info-asia@kme.com
BELGIUM	GERMANY	SPAIN
N.V. KME Benelux SA Leuvenbaan 3 1820 Steenokkerzeel Phone + 32-2-7 20 18 89 Fax + 32-2-7 20 87 80 E-Mail info-benelux@kme.com	KME Germany AG & Co. KG Klosterstrasse 29 49023 Osnabrück Phone + 49 541 321-0 Fax + 49 541 321-1366 E-Mail info@kme.com	KME Spain S.A. Ctra Sabadell Mollet. km5 Sta. Pertètua de Mogado 08130 Barcelona Phone + 34 93 547 7090 Fax + 34 93 547 7091 E-Mail info-iberica@kme.com
CHINA	GERMANY	SWEDEN
KME Metals Shanghai Trading Ltd. Hong Qiao Road 808, Rm A807 20030 Shanghai Phone + 86 21 644 786 80 Fax + 86 21 644 786 79 E-Mail zhiming.chen@kme.com.cn	KME Germany AG & Co. KG Frankentalstrasse 5 52222 Stolberg Phone + 49 2402 105-0 Fax + 49 2402 105-355 E-Mail info-connectors@kme.com	Metallcenter Sverige AB Silkesvägen 26 SE-33153 Phone + 46 370 40900 Fax + 46 370 40919 E-mail mail@metallcenter.se
CZECH REPUBLIC	HUNGARY	SWITZERLAND
KME Czech Republic s.r.o. nám. Sítňá 31 05 27201 Kladno Phone + 42-0312-60 82 50 Fax + 42-0312-60 82 51 E-Mail info-cz@kme.com	KME Hungaria Színesfém Kft. Andor u.47-49 VI.em.616-618 1119 Budapest Phone +36-(0)1-2 05 97 75 Fax +36-(0)1-2 05 97 76 E-Mail info-hungary@kme.com	KME Suisse SA Binzallee 22 8055 Zürich Phone + 41-43 3 88 20 00 Fax + 41-43 3 88 20 01 E-Mail info-ch@kme.com
DANMARK	ITALY	UNITED KINGDOM
KME Danmark A/S Næsbyvej 26 5000 Odense C. Phone + 45-65-91 64 10 Fax + 45-65-91 64 11 E-Mail info-dk@kme.com	KME Italy S.p.A. Via Corradino d'Ascanio. 4 20142 Milan Phone + 39 02 893 88-1 Fax + 39 02 893 88-475 E-Mail info@kme.com	KME UK Severn House Prescott Drive Warndon Business Park WR4 9NE Worcester Phone + 44 1905 751800 Fax + 44 1905 751801 E-Mail info-uk@kme.com
FINLAND	POLAND	USA
Metallcenter Finland OY AB Piiskakuja 1 FIN-20380 Phone + 358 20 741 1720 Fax + 358 20 741 1723 E-mail mail@metallcenter.fi	KME Polska Sp. z o.o. ul. Wszystkich Świętych 11 32-650 KETY Phone + 48 33 841 09 94 Fax + 48 33 845 19 54 E-mail info-polska@kme.com	KME America Inc. 1000 Jorie Boulevard. Suite 111 60523 Oak Brook. Illinois Phone + 1 630 990-2025 Fax + 1 630 990-0258 E-Mail sales@kmeamerica.com

**Internet**

www.kme.com

**Disclaimer**

This material flyer is giving you general information about our products. We have collected the information with great care, even though KME can take no warranty for the completeness, correctness and for being up-to-date. The statements are in no way to be deemed as an advisory service of our company, but are only descriptive without guaranteeing or granting property-related qualities. The data given cannot replace expert advice or customers own tests. Liability of the statements in the flyer is specifically excluded unless compelling legal liability facts are evident. Technical changes reserved.