

# C26800

## CuZn33



## Industrial Rolled

Alloy Designation	
EN	CuZn33
DIN CEN/TS 13388	CW506L
JIS	C 2680
BS	CZ 103
UNS	C26800

Chemical Composition		
Weight percentage		
Cu	67	%
Zn	Rest	%

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

**Brass Rolled Products**



KME offers a wide range of brass rolled products in the form of strips, sheets and discs in order to meet our customer's needs for industrial manufacturing or for the production of gift articles and decorative objects.

**Characteristics**

CuZn33, as well as CuZn28 and CuZn30 is combining excellent cold forming properties with good mechanical strength. CuZn30 has good hot forming properties and excellent soldering and brazing properties. Due to the outstanding deep drawing properties CuZn33 and the other two mentioned alloys are called "deep-draw" or "cartridge" brass. We produce qualities with grain sizes below 5 µm if needed.

**Main Applications**

**Architecture:** Handrails, Grillwork  
**Automotive:** Tanks, Radiator Cores  
**Builders Hardware:** Locks, Push Plates, Finish Hardware, Kick Plates, Stencils.  
**Electrical:** Socket Shells, Wire Flashlight Shells, Clips, Lamp Sockets, Lamp Fixtures, Screw Shells, Reflectors. Fasteners Grommets, Eyelets, Screws, Rivets, Pins, Fasteners. Industrial Air Pressure Conveyer Systems, Bead Chain, Springs.  
**Marine:** Fasteners.  
**Plumbing:** Plumbing Accessories, Sanitary Traps, Sink Strainers, Bathroom Fixtures.  
**Typical Application:** Metal goods, Deep drawn parts, Components for the electrical industry, stamped parts, Connectors.

**Preferred Applications**

Jewellery and Metall Goods	Deep Drawn Parts	Components for the Electrical Industry	Stamped Parts	Connectors
xx	xx	xx	xx	x

x = well suited    xx = particularly well suited

**Physical Properties**  
 Typical values in annealed temper at 20 °C

Density		8.5	g/cm <sup>3</sup>
Thermal expansion coefficient	-128 .. 20 °C	9.0	10 <sup>-6</sup> /K
	20 .. 300 °C	19.9	10 <sup>-6</sup> /K
Specific heat capacity		0.377	J/(g·K)
Thermal conductivity		121	W/(m·K)
Electrical conductivity (1 MS/m = 1 m/(Ω mm <sup>2</sup> ))		≥ 15	MS/m
Electrical conductivity (IACS)		26	%
Thermal coefficient of electrical resistance (0 .. 100 °C)		1.6	10 <sup>-3</sup> /K
Modulus of elasticity ( 1 GPa = 1 kN/mm <sup>2</sup> ) cold formed		99 .. 115	GPa
	annealed	112	GPa

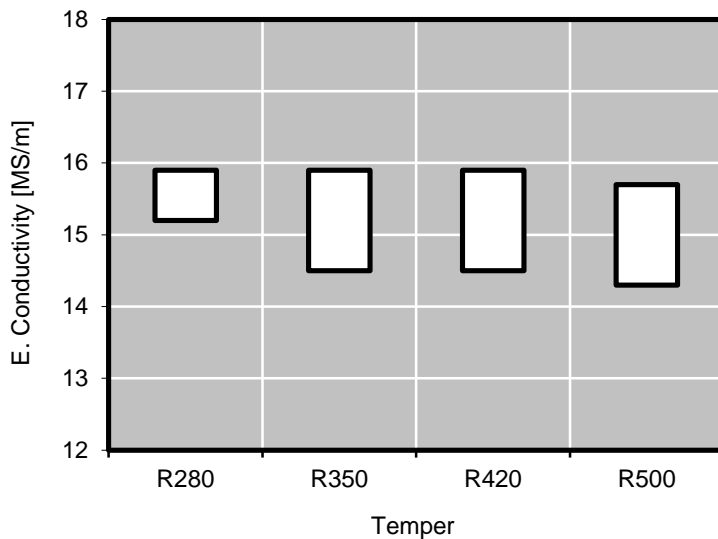


**Mechanical Properties (EN 1652)**

Temper		Tensile Strength	Yield Strength	Elongation Minimum	Grain Size	Hardness
		R <sub>m</sub>	R <sub>p0.2</sub> *	A <sub>50mm</sub>	µm	HV *
		MPa	MPa	%		HV
<b>R280</b>	<b>G010</b> Annealed	280 .. 380	≤ 170	40	<15	≤120
	<b>G020</b> Annealed				15 .. 30	≤95
	<b>G030</b> Annealed				20 .. 40	≤90
	<b>G050</b> Annealed				35 .. 70	≤80
<b>R350</b>		350 .. 430	170	23		95 .. 125
<b>R420</b>		420 .. 500	300	6		125 .. 155
<b>R500</b>		> 500	450	3		> 155

\* 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 750 .. 870°C	Good
Machinability (Rating 30)	Fair
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding	Good
Gas Shielded Arc Welding	Fair
Laser Welding	Less Suitable
Soft Annealing	450 .. 680°C
Stress Relieving Annealing	200 .. 300°C

\* For more details call our technical service

**Corrosion Resistance\***

Resistant to:

CuZn33 has a good resistance to water, water vapour, different saline solutions, many organic liquids. Industrial-, maritime- and country air.

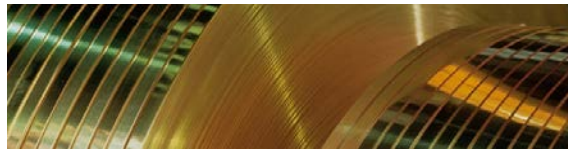
CuZn33 in cold formed temper, as well as under internal and external tension, tends to stress corrosion cracking, when in contact with e.g. hydrous ammonia, ammoniac salt or amine and others.

Trough a heat-treatment of semi-finished or finished products the risk of stress corrosion can be reduced.

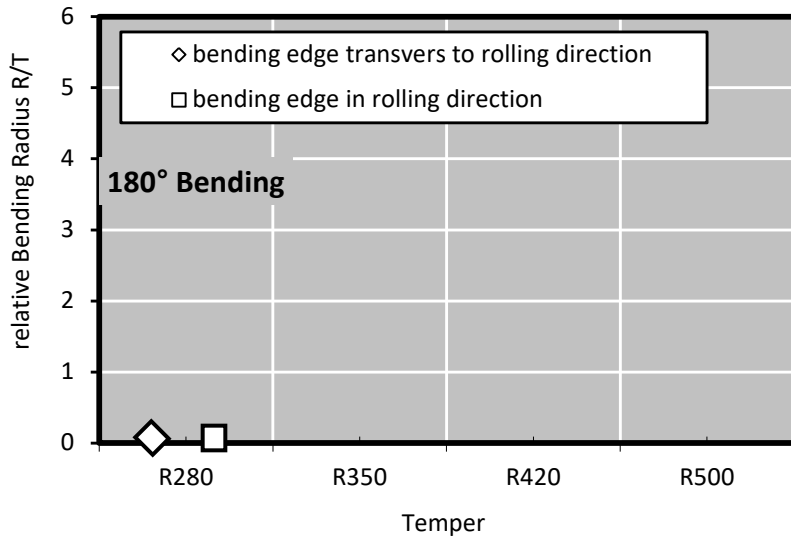
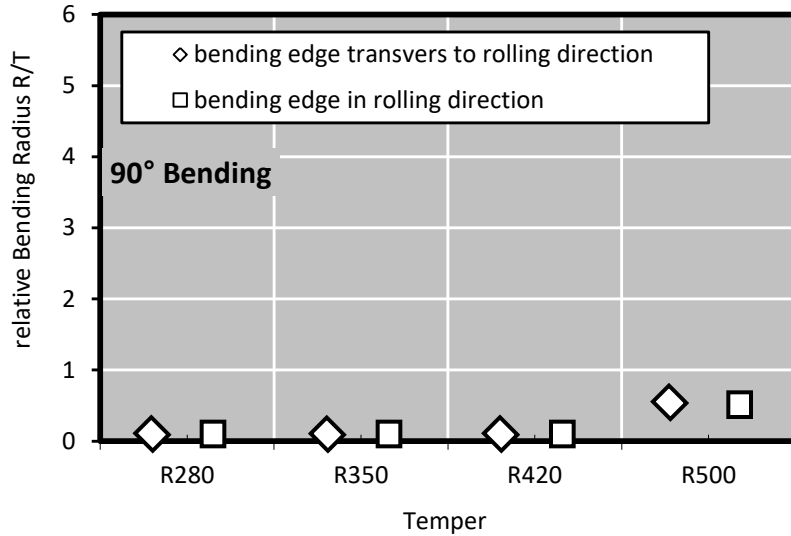
Not resistant to:

Acids, hydrous sulphur components, hydrous ammonia (stress corrosion cracking) in non-stress-relieved condition.

\* For more details call our technical service



Bending Properties Thickness: ≤ 0.5 mm

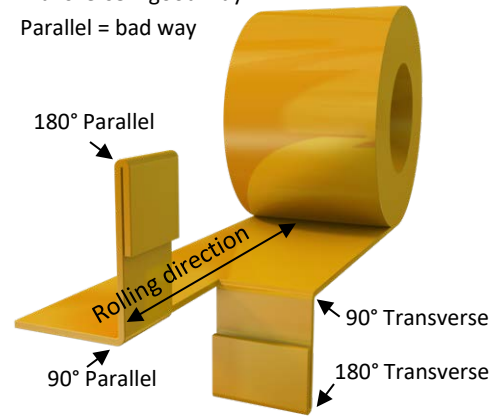


Bending test according to EN ISO 7438 is done with 10 mm wide samples. Smaller samples in general – as well as lower thickness – allow a lower bending radius without cracks. If needed we supply bending optimized temper classes that far exceed standard quality.

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

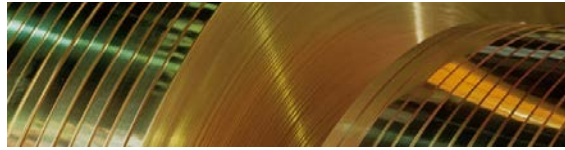
To find out the minimum possible bending radius take the R/T value from the list.

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

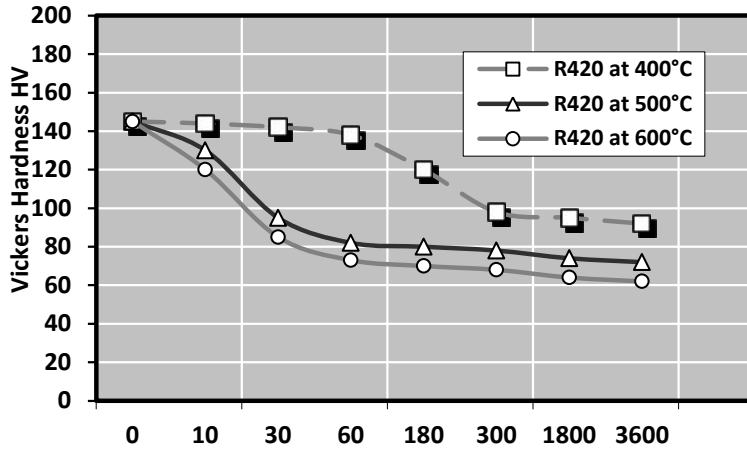
Bending Properties\*

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	0
R350	≤ 0.5	0	0	0	0
R420	≤ 0.5	0	0	-	-
R500	≤ 0.5	0.5	0,5	-	-

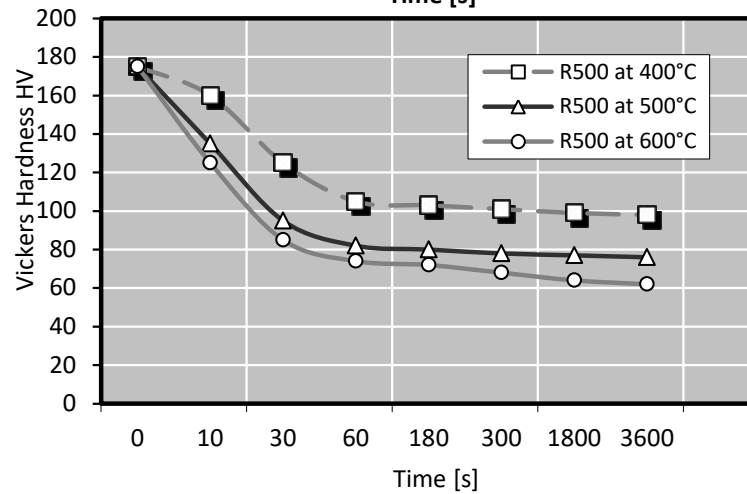
\* Measured at sample width 10 mm according to EN 1654  
 Possible bending radius = (R/T) x thickness



Softening Resistance

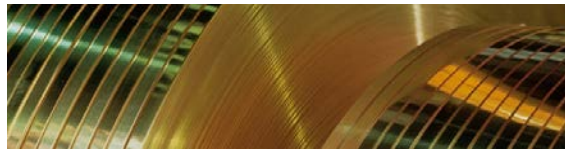


After short time heat treatment Vickers Hardness is measured. The diagram shows typical values.



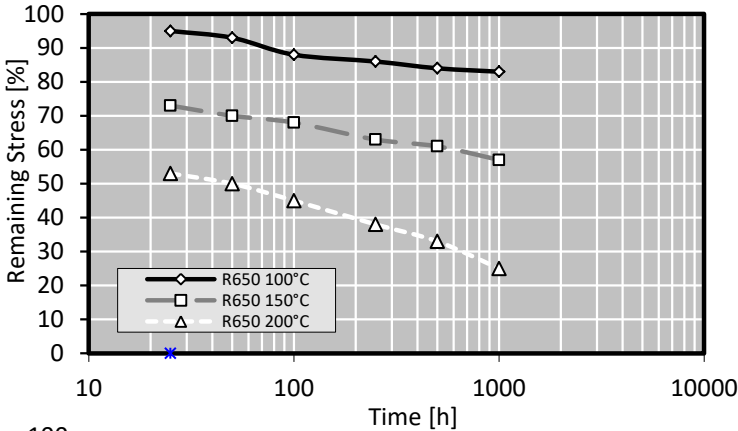
Bend Fatigue (at room temperature)

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

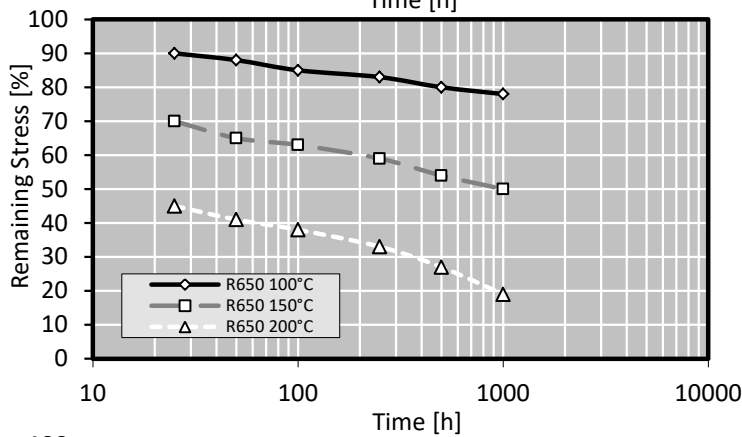
Values from CuZn30 Thermal stress relieved, CuZn33 will have lower values



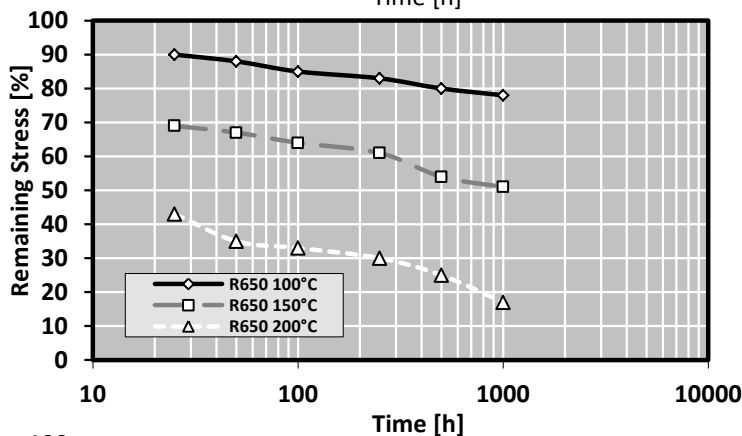
Initial Stress:  
50% of Rp0.2  
Parallel  
Rolling Direction

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.

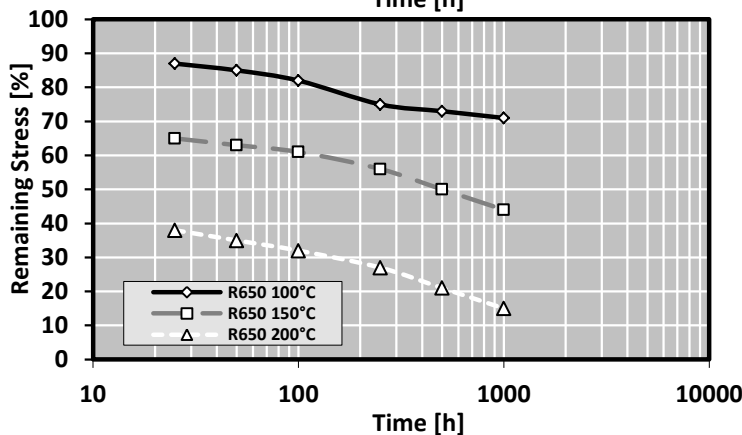
Typical test sample thickness is 0.3 – 0.6 mm.



Initial Stress:  
50% of Rp0.2  
Transverse  
Rolling Direction



Initial Stress:  
80% of Rp0.2  
Parallel  
Rolling Direction



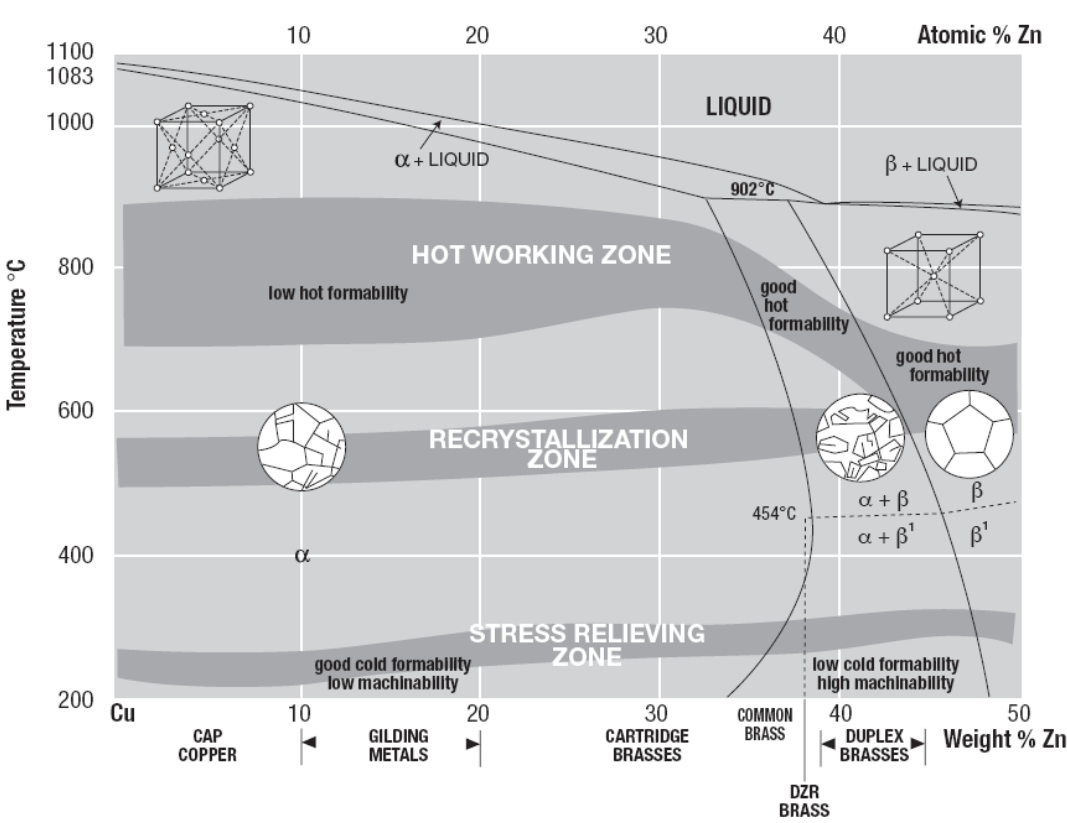
Initial Stress:  
80% of Rp0.2  
Transverse  
Rolling Direction

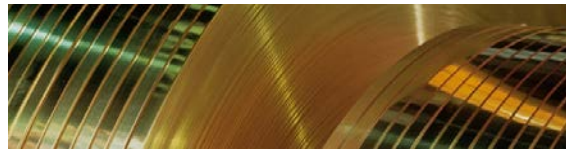


Brass Processing								
Alloy	Machining	Mechanical Polishing	Electro Polishing	Brazing	Gas Welding	Gas Shielded Arc Welding	Resistance Welding	Laser Welding
CuZn5	4	1	1	1	2	2	2	3
CuZn10	4	1	1	1	2	2	2	3
CuZn15	4	1	1	1	2	2	2	3
CuZn20	4	1	1	1	2	2	2	3
CuZn28	4	1	1	1	2	3	2	4
CuZn30	4	1	1	1	2	3	2	4
CuZn33	4	1	1	1	2	3	2	4
CuZn36	3	1	2	1	2	3	2	4
CuZn37	3	1	3	1	2	3	2	4
CuZn39Pb2	1	2	4	3	4	4	3	4
CuZn40	3	2	3	2	4	3	2	4
CuSn3Zn9 CuSn2Zn10	3	1	2	1	2	2	3	3

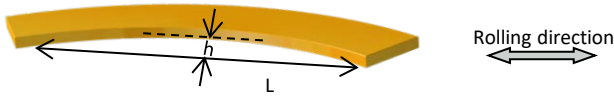
1= excellent                      2 = good                      3 = fair                      4 = less suitable

Phase Diagram Copper Zink (after Struers Scientific Instruments)





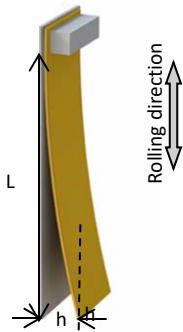
**Camber**



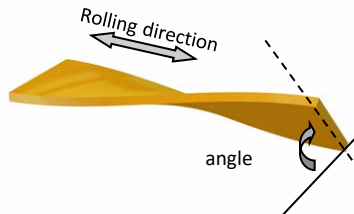
**Evenness**



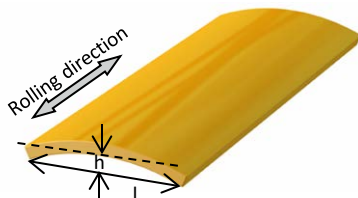
**Coil set**



**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 .. 1,000
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]
0.05 .. 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)	≥ 0.05 .. 6.00	mm
		Strip width	≥ 3 .. 1,000	mm
		Outside diameter	≤ 1,400	mm
		Weight (Standard)	≤ 8,400	kg
		Weight (Deep-Drawing Quality)	≤ 8,000	kg
		Weight per mm	≤ 12.0	kg
	Traverse wound strip	Thickness	≥ 0.2 .. ≤ 1.50	mm
		Width	≥ 8 .. ≤ 60.0	mm
		Weight	300 .. 1,500	kg
		Drums: wood, plastic, metal, flangeless		
	<b>TECSTRIP®</b> _multicoil	Thickness	0.18 .. 0.80	mm
		Width	15 .. 50	mm
		Inner diameter 300 mm for thickness	0.15 .. 0.80	mm
		Inner diameter 400 mm for thickness	0.41 .. 0.80	mm
		Maximum weight	5,000	kg
		Outer diameter maximum	1,600	mm
	Sheet ≤ 6.35 mm	Thickness	0.3 .. 6.35	mm
		Width	50 .. 1,000	mm
		Length	200 .. 6,500	mm
		Weight	2,800 .. 8,000	kg
		Sheets in standard dimensions e.g. 1,000 x 2,000 mm on stock		
	Sheet > 6.35 mm	Thickness	6.35 .. 9.50	mm
		Width	50 .. 1,000	mm
		Length	200 .. 7,500	mm
		Weight	≤ 10,000	kg
		Sheets in standard dimensions e.g. 1,000 x 2,000 mm		
	Plate	Thickness	9.5 .. 150	mm
		Width	≤ 1,000	mm
		Length	≤ 15,000	mm
		Weight	≤ 8,000	kg
	Disc	Thickness	0.3 .. 150	mm
		Diameter	20 .. 1,000	mm
		Weight	≤ 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			
	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		
	Bright and polished appearance	Width	≤ 1,000 mm
		Thickness	≤ 1.5 mm
	GS1 Surface Quality	Skin passed material, meaning it has been	
	Surface with extra low residual carbon content possible.		
	Protection with oil or adhesive foil on request		

\* Further details you find at [www.kme.com](http://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