C27000
CuZn36

KME

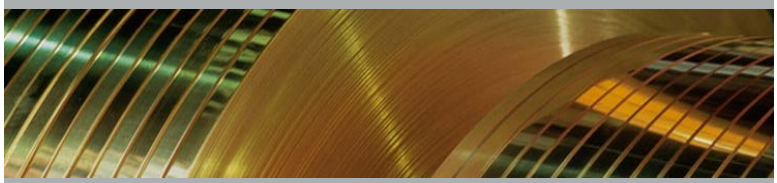
Industrial Rolled

Alloy Designation	
EN	CuZn36 (2.0335)
DIN CEN/TS 13388	CW507L
JIS	C 2700
BS	CZ 108
UNS	C27000

Chemical Composition Weight percentage		
Cu	64	%
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

CuZn36 is the major brass alloy for the cold forming process. Even though brasses with lower Zinc content have better cold forming properties, CuZn36 is the most used alloy. Reasons for this are on the one hand economical due to lower price of Zinc compared to Copper, on the other hand the forming properties of this alloy meet the demand of many applications .

Main Applications

Architecture: Handrails, Grillwork
Automotive: Radiator Cores, Tanks.
Builders Hardware: Locks, Push Plates, Finish Hardware, Kick Plates, Stencils, Hinges
Electrical: Socket shells, Flashlight Shells, Lamp Fixtures, Reflectors, Screw Shells
Fasteners: Pins, Rivets, Grommets, Eyelets, Screws
Industrial: Springs, Chain, Bead Chain.
Marine: Fasteners.
Plumbing: Sink Strainers, Plumbing Accessories. Casting Characteristics.
Typical Application: Metal goods, Deep drawn parts, Stamped parts, Connectors.

Preferred Applications

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

x = well suited xx = particularly well suited

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.45	g/cm³
Thermal expansion coefficient	- 73°C	17.0	10^{-6}/K
	20 .. 300 °C	20.2	10^{-6}/K
Specific heat capacity		0.377	J/(g·K)
Thermal conductivity		121	W/(m·K)
Electrical conductivity (1 MS/m = 1 m/(Ω mm²)		≥ 14	MS/m
Electrical conductivity (IACS)		24	%
Thermal coefficient of electrical resistance (0 .. 100 °C)		1.7	10^{-3}/K
Modulus of elasticity (1 GPa = 1 kN/mm²) cold formed		99 .. 115	GPa
	annealed	110	GPa

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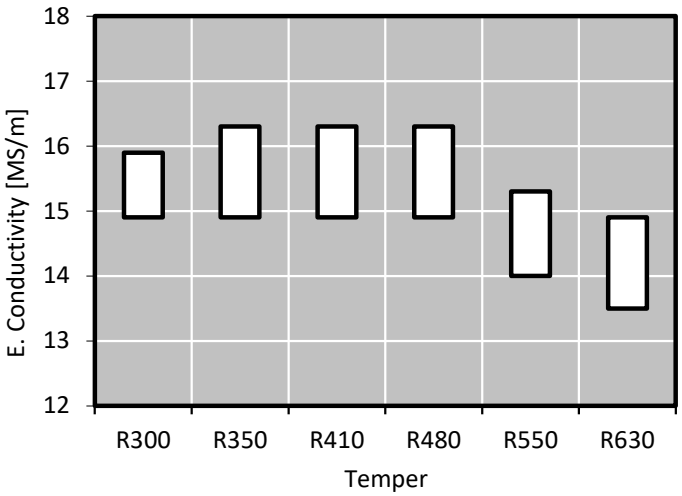
Mechanical Properties (EN 1652)

Temper		Tensile Strength Rm	Yield Strength $Rp_{0.2}$*	Elongation Minimum A_{50mm}	Grain Size	Hardness HV *
		MPa	MPa	%	µm	HV
R300	**G010** Annealed	300 .. 370	≤ 180	38	<15	≤120
	G020 Annealed				15 .. 30	≤95
	G030 Annealed				20 .. 40	≤90
	G050 Annealed				35 .. 70	≤80
R350		350 .. 430	170	19		95 .. 125
R410		410 .. 490	300	8		120 .. 155
R480		480 .. 560	430	3		150 .. 180
R550		≥ 550	500	-		>170
R630		≥ 630	600	-		>190

* 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 .. 850°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:

CuZn36 ha s a good resistance to water, water vapour, different saline solutions, many organic liquids .

Land, sea and industrial atmosphere.

Not resistant to:

Under certain conditions (water with high chlorine-content and low carbonate-hardness) a form of corrosion called “dezincification” can occur.

Furthermore this alloy tends in cold-formed temper under internal and/or external tensile stress when aggressive agents like ammoniac, amine ammonia-salts are present to “stress corrosion cracking”. Tensile stress can be applied after fabrication during assembly or installation.

A heat treatment can help to avoid stress corrosion cracking. Semi-finished products can get a stress relieving annealing treatment or softening treatment.

* For more details call our technical service

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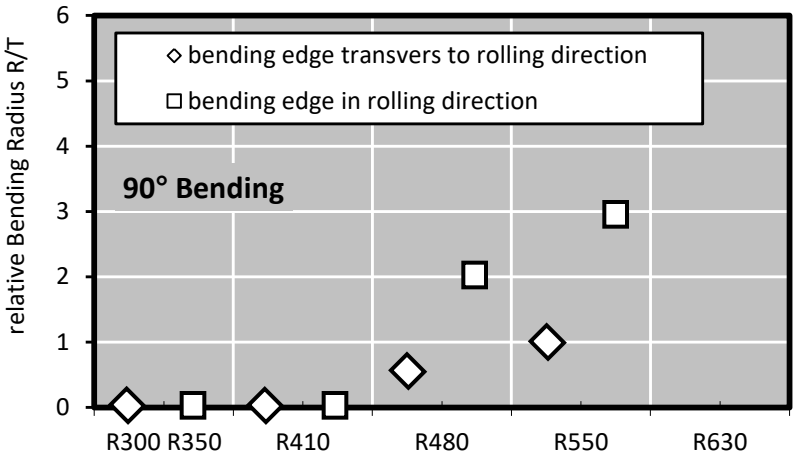
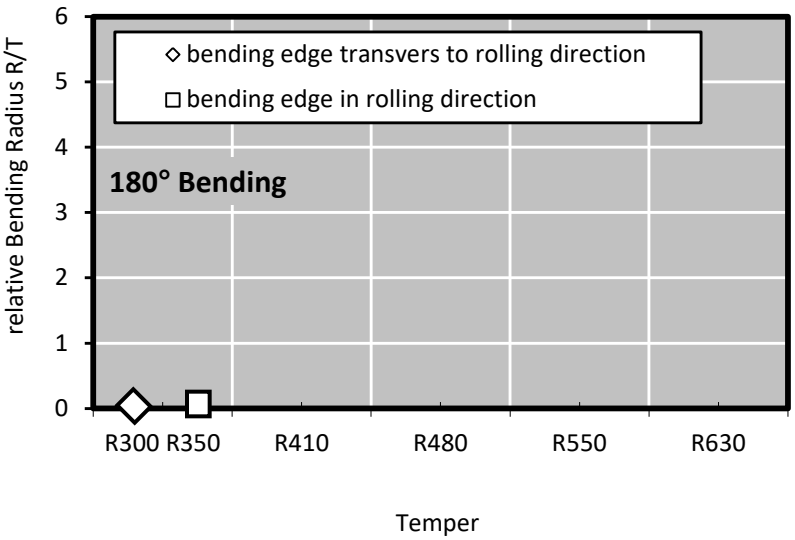
Bending Properties Thickness: ≤ 0.5 mm





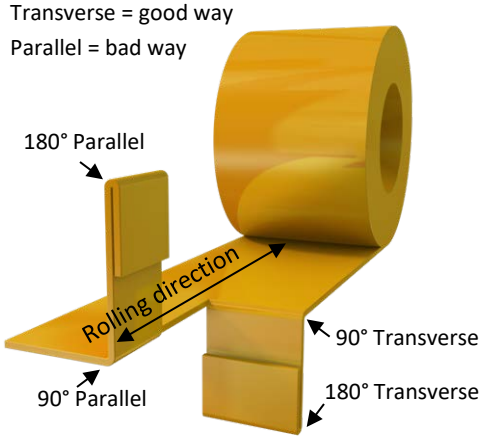
Bending test according to EN ISO 7438 is done with 10 mm wide samples. Smaller samples in general – as well as lower thickness – allow a lower bending radius without cracks. If needed we supply bending optimized temper classes that far exceed standard quality.

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

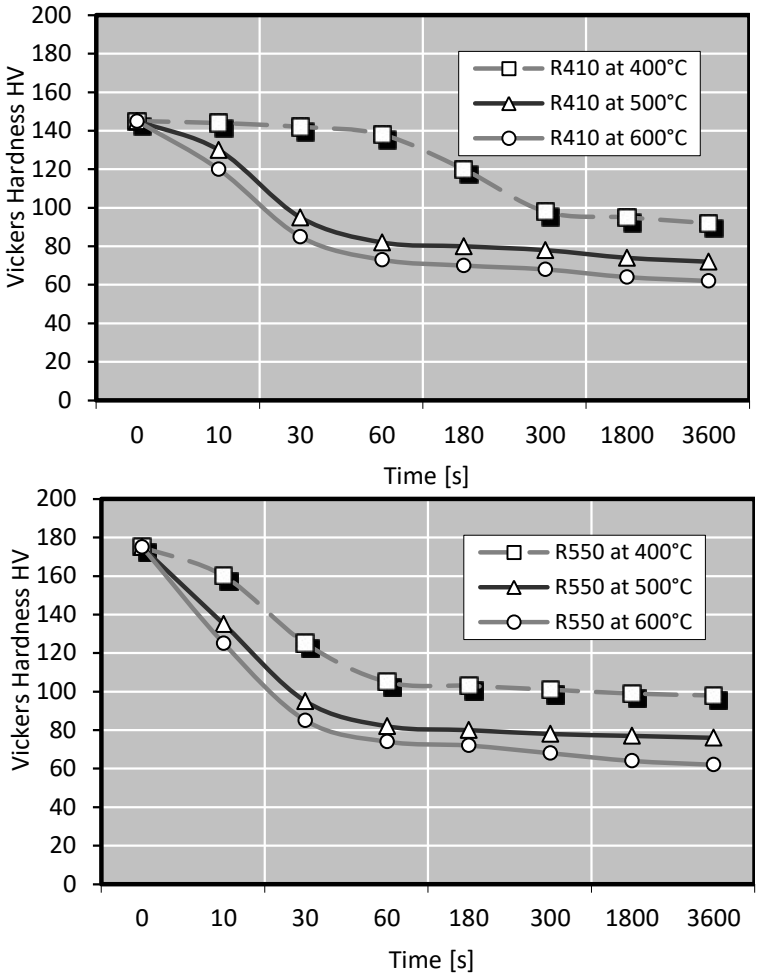
Bending Properties*

Temper	Thickness Range	Bending 90°		Bending 180°	
		Trans-vers	Parallel	Trans-vers	Parallel
	mm	R/T	R/T	R/T	R/T
R270	≤ 0.5	0	0	0	0
R350	≤ 0.5	0	0	0	0
R410	≤ 0.5	0	0	-	-
R480	≤ 0.5	0,5	2	-	-
R550	≤ 0.5	1	3	-	-
R630	≤ 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.

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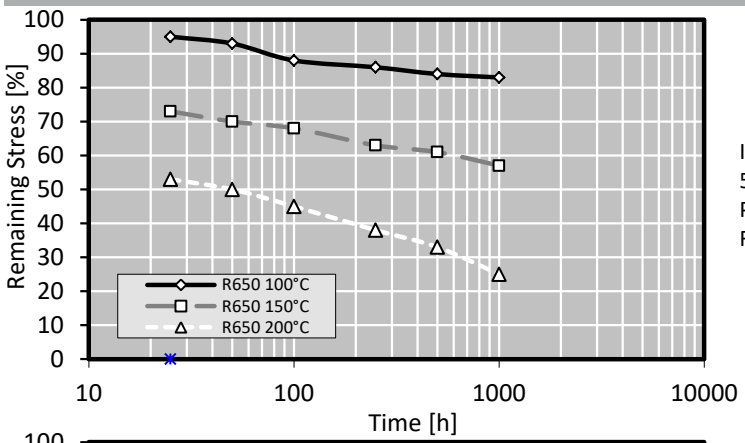
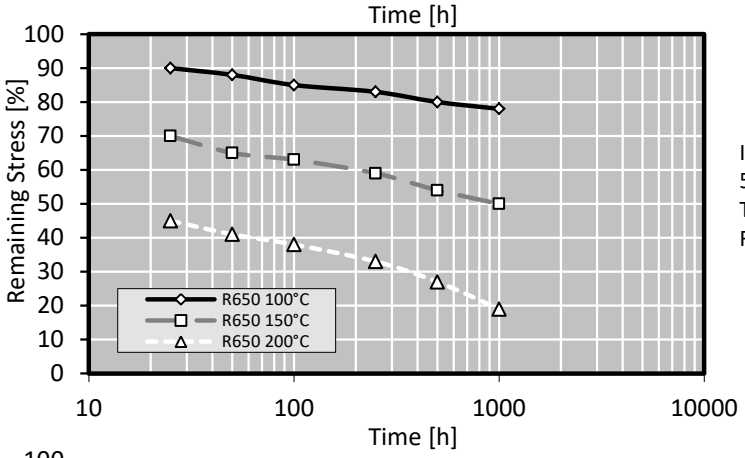
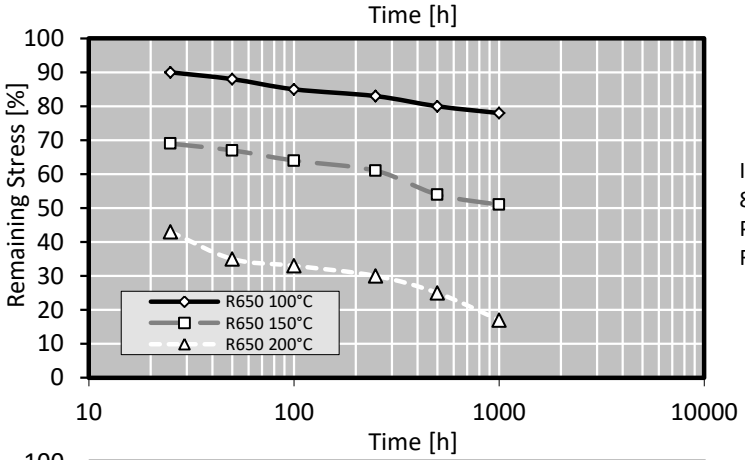
Relaxation Properties **values from CuZn30** Thermal stress relieved, CuZn36 is about much less resistant



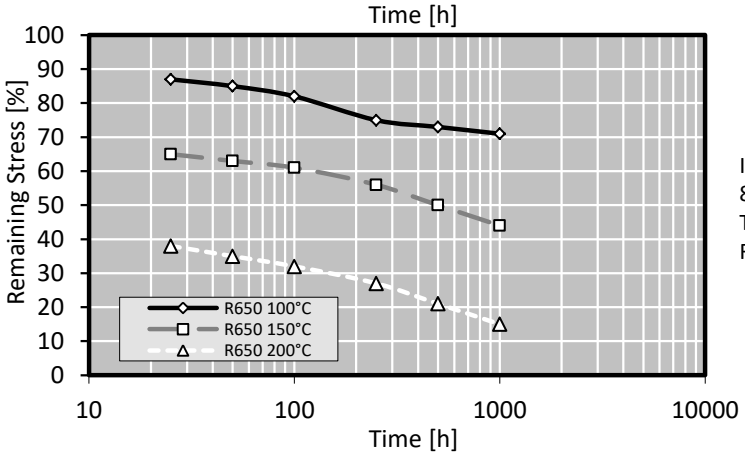
Initial Stress:
50% of Rp0.2
Parallel
Rolling Direction



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

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.

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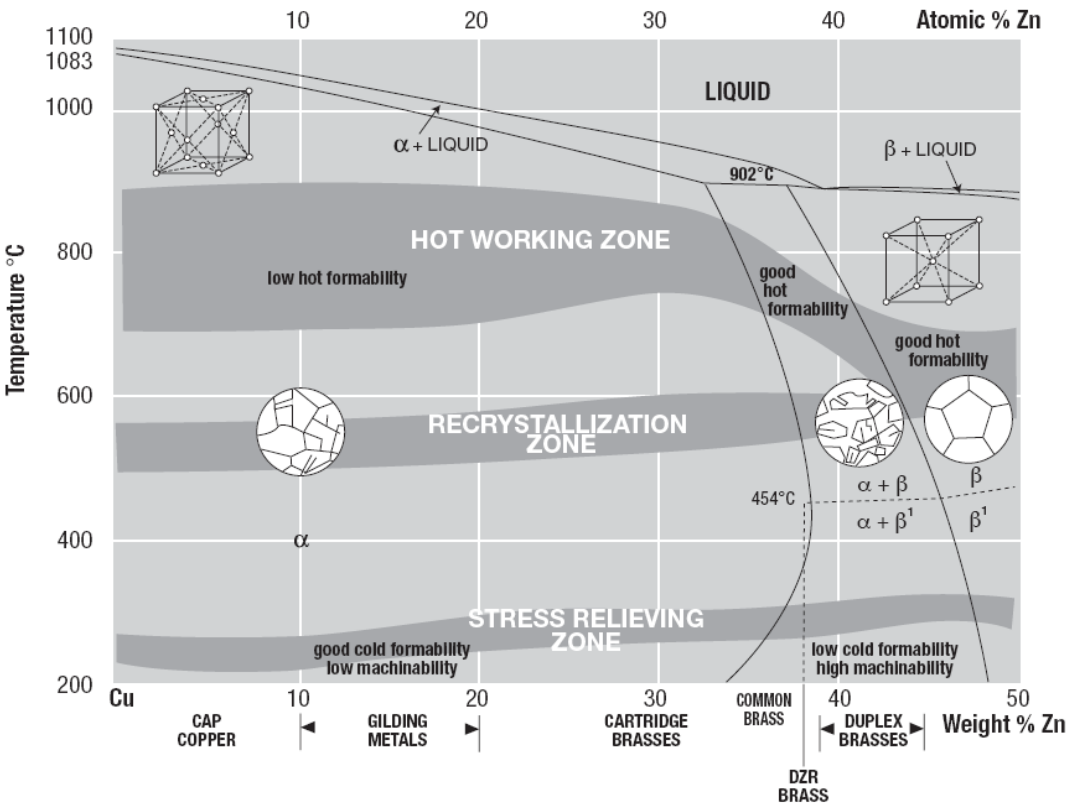
Brass Processing

KME	Alloy	Machining	Mechanical Polishing	Electro Polishing	Brazing	Gas Welding	Gas Shielded Arc Welding	Resistance Welding	Laser Welding
305	CuZn5	4	1	1	1	2	2	2	3
310	CuZn10	4	1	1	1	2	2	2	3
315	CuZn15	4	1	1	1	2	2	2	3
320	CuZn20	4	1	1	1	2	2	2	3
328	CuZn28	4	1	1	1	2	3	2	4
330	CuZn30	4	1	1	1	2	3	2	4
333	CuZn33	4	1	1	1	2	3	2	4
336	CuZn36	3	1	2	1	2	3	2	4
337	CuZn37	3	1	3	1	2	3	2	4
339	CuZn39Pb2	1	2	4	3	4	4	3	4
340	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)



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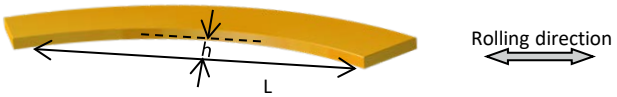
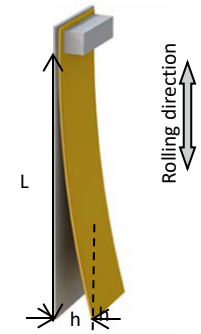
Camber

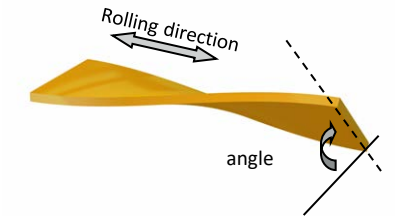


Evenness

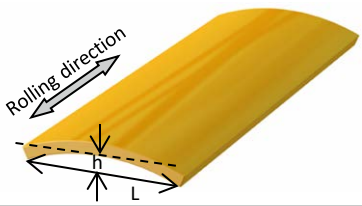
Coil set



Twist



Transverse Flatness



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

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

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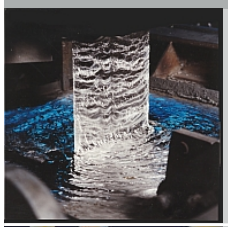
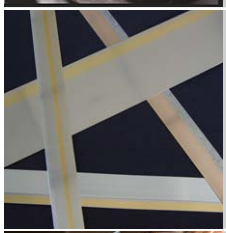
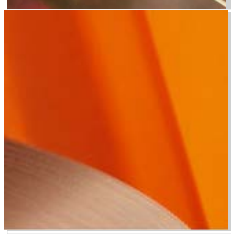
Formats		Dimension*		
	Coil	Strip thickness (other thicknesses on request)	≥ 0.05 .. 6.00	mm
		Strip width	≥ 3 .. 1,000	mm
		Outside diameter	≤ 1,400	mm
		Weight (Standard)	≤ 8,400	kg
		Weight (Deep-Drawing Quality)	≤ 8,000	kg
		Weight per mm	≤ 12.0	kg
	Traverse wound strip	Thickness	≥ 0.2 .. ≤ 1.50	mm
		Width	≥ 8 .. ≤ 60.0	mm
		Weight	300 .. 1,500	kg
		Drums: wood, plastic, metal, flangeless		
	**TEC**STRIP® _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 Different thickness per side possible	Width Thickness Tin Layer Thickness	≤ 330 ≤ 1.5 0.4 .. 20	mm mm µm
	Electroplating Tin, Silver, Gold, Cu-Flash, Ni-Flash, Selective plating	Width Thickness Other coatings on request	≤ 400 ≤ 2.5	mm mm
	Profiled strips STOL®Multigauge	Width Thickness Other width on request	15 .. 90 0.23 .. 1	mm mm
	Bright and polished appearance GS1 Surface Quality	Width Thickness Skin passed material, meaning it has been	≤ 1,000 ≤ 1.5	mm mm
	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