CuNi10Fe1,6Mn
C70600

KME

Industrial Rolled

Alloy Designation	
EN	CuNi10Fe1,6Mn CW352H
DIN CEN	2.0872
UNS	C70600
BS	CN102
JIS	C 7060T; CNP1
EEMUA	UNS 7060X

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	Rest	%
Ni	9 … 11	%
Fe	1 … 2	%
Mn	0.5 … 1	%

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

Characteristics

For many decades, copper-nickel alloy CuNi 90/10 has extensively been used as a piping material for seawater systems in shipbuilding, offshore, and desalination industries. Attractive characteristics of this alloy combine excellent resistance to uniform corrosion, remarkable resistance to localised corrosion in chlorinated seawater, and higher erosion resistance than other copper alloys and steel. Furthermore, CuNi 90/10 is resistant to biofouling providing various economic benefit.

Main Applications

Cladding for corrosion protection of steel structures, Sheathing on offshore structures, Piping systems, pipes, fittings, flanges, desalination plant, offshore wind structures, shipbuilding

Preferred Applications

Fire water systems	Seawater cooling systems	Deck steam pipes	Seawater feed lines to desalination and processing units	Hydraulic and pneumatic systems
xx	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/cm³
Thermal expansion coefficient -183 .. 10 °C	13.0	10^{-6}/K
20 .. 300 °C	19.0	10^{-6}/K
Specific heat capacity	0.38	J/(g·K)
Thermal conductivity	50.2	W/(m·K)
Electrical conductivity (1 MS/m = 1 m/(Ω mm²)	5	MS/m
Electrical conductivity (IACS)	9	%
Thermal coefficient of electrical resistance (0 .. 100 °C)	7	10^{-4}/K
Modulus of elasticity (1 GPa = 1 kN/mm²) cold formed	130	GPa
annealed	138	GPa

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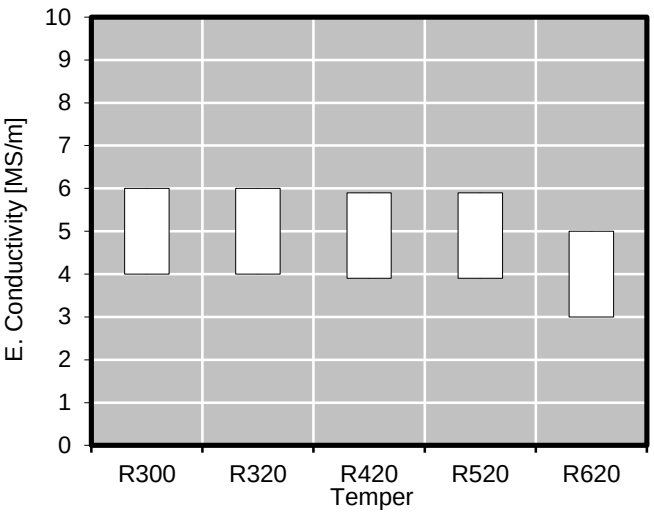
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *
	MPa	MPa	%	HV
R300	>300	>100	20	70
R320	>320	>200	12	100
R420	420 .. 510	370	3	120
R520	520 .. 610	480	2	150
R620	> 620	590	-	170

*only for information ** additional effort in production

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. 80% between annealings	Excellent
Hot Forming Properties at 850 .. 950°C	Good
Machinability (Rating 20)	Good
Electroplating Properties	Good
Soft Soldering, Brazing	Excellent
Resistance Welding	Excellent
Gas Shielded Arc Welding	Good
Laser Welding	Excellent
Soft Annealing	700 .. 825°C, 1 .. 3h
Stress Relieving Annealing	275 .. 400°C, 1 .. 3h

* For more details call our technical service

Corrosion Resistance*

Resistant to:

CuNi10Fe1,6Mn belongs to the most corrosion resistant copper alloys. It is resistant to humidity, non oxidizing acids (without oxygen in solution), organic acids, dry gases like oxygen, chlorine, hydrogen chloride, hydrogen sulphide, sulphur dioxide, hydrogen fluoride and carbon dioxide.

The resistance of this alloy has its cause in the formation of a stable coating layer.

OSNA®-10 is resistant to cold and hot seawater at high flow velocity (1 .. 3.5m/s).

Practically resistant against stress corrosion cracking.

Selective corrosion is extremely low, pitting (localized corrosion) appears very seldom.

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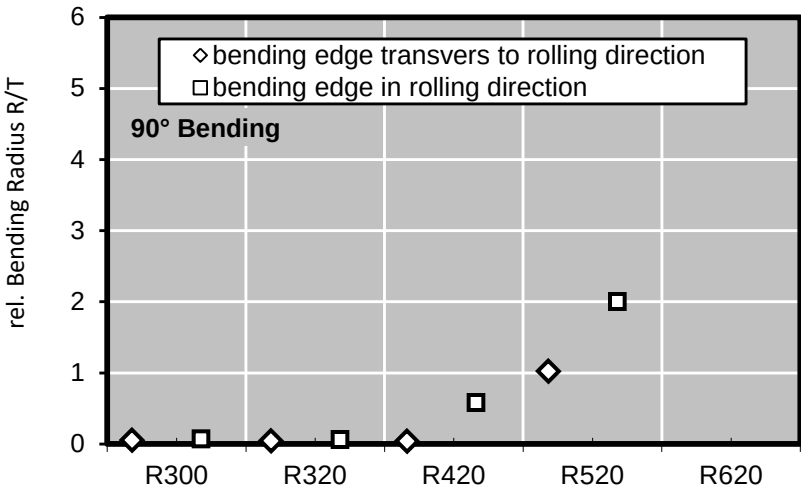
Bending Properties Thickness: ≤ 0.5 mm

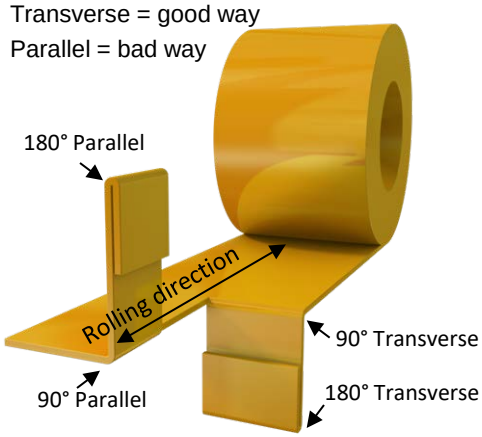


Bending test according to EN ISO 7438 is done with 10 mm wide samples. Smaller samples in general – as well as lower thickness – allow a lower bending radius without cracks. If needed we supply bending optimized temper classes that far exceed standard quality.

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



Bending Properties*

Temper	Thickness Range	Bending 90°		Bending 180°	
		Trans-vers	Parallel	Trans-vers	Parallel
	mm	R/T	R/T	R/T	R/T
R300	≤ 0.5	0	0		
R320	≤ 0.5	0	0		
R420	≤ 0.5	0	0.5		
R520	≤ 0.5	1	2		
R620	≤ 0.5	-	-		

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

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

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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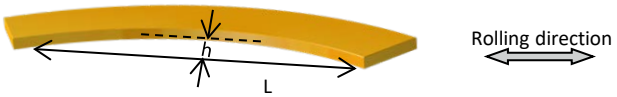
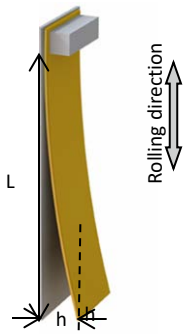
Camber

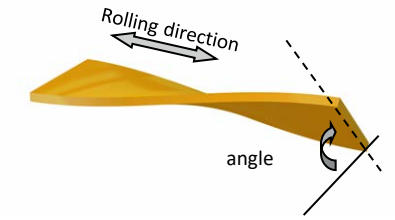


Evenness

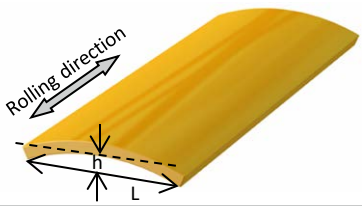
Coil set



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

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

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

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Formats		Dimension* (General Information)		
	Coil	Strip thickness (other thicknesses on request)	≥ 0.1 .. 6.00	mm
		Strip width	≥ 3 .. 1.250	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 ..1.250	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 .. 2.450	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	≤ 4.500	mm
		Length	≤ 15.000	mm
		Weight	≤ 8.000	kg
	Disc	Thickness	0.3 .. 150	mm
		Diameter	20 .. 3.100	mm
		Weight	≤ 10.000	kg

* Some combinations might not be possible

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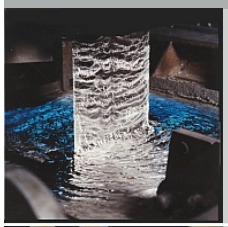
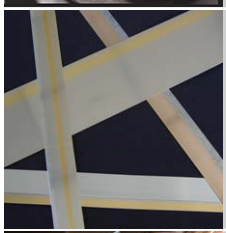
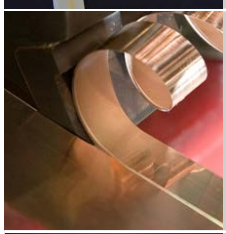
Surface coatings & Special Treatments *		Dimension		
	Hot-Dip tinned and STOL®28M Tin-Silver STOL®13 Thermic Sn Different thickness per side possible	Width Thickness Tin Layer Thickness	≤ 330 ≤ 1.5 0.4 .. 20	mm mm µm
	Electroplating Tin, Silver, Gold, Cu-Flash, Ni-Flash, Selective plating	Width Thickness 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
	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