COPPER MATERIALS

KME

ENGINEERING
COPPER SOLUTIONS

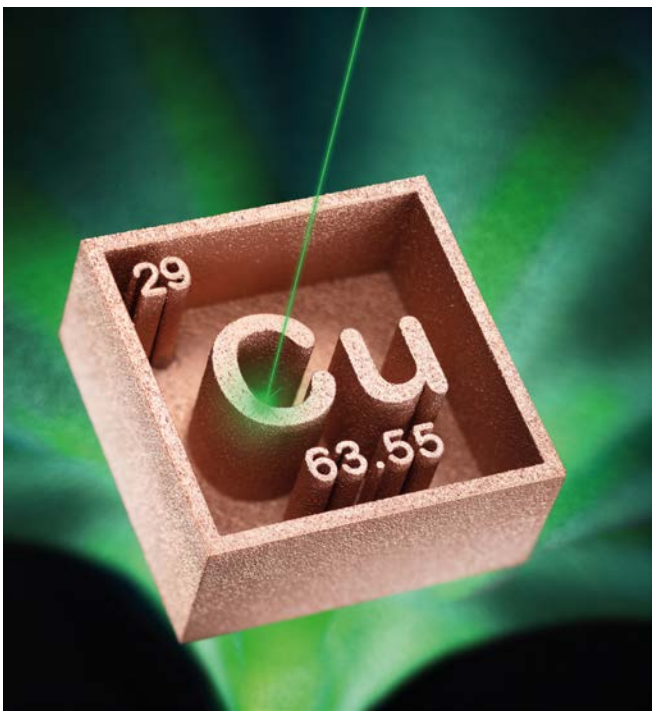
Copper and copper alloys for semi products and stamped parts
Jan. 2021

3D-PRINTING WITH COPPER

AN INNOVATIVE MANUFACTURING TECHNOLOGY BASED ON KME EXPERTISE

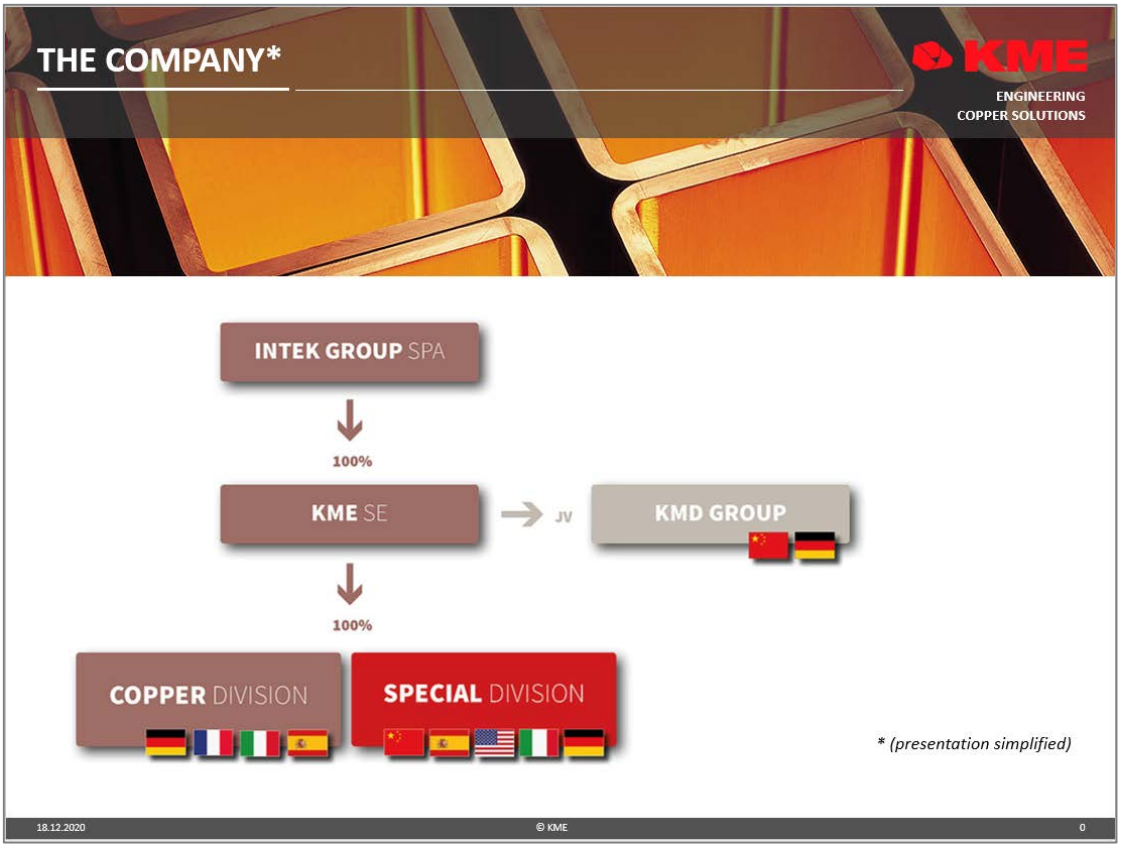
Additive Manufacturing (AM) is a process using digital design data for the shaping of fully functional objects. In doing so, the material of choice is applied in layers on top of one another in order to produce threedimensional workpieces. 3D printers used in this manufacturing process melt copper powder by laser beam and shape objects from the molten mass. This is especially interesting for a whole range of modern and future technologies. In the TECHNOS network, KME is now working in close cooperation with the University of Osnabrück on perfecting the application of Selective Laser Beam Melting (SLM) for 3D printing with copper.

KME is a co-founder of TECHNOS e.V., an industry and research network to which the company is significantly contributing its expertise as an engineering service provider for solutions in copper. As a part of TECHNOS e.V., the new Technology Campus for 3D Material Design was established in the KME works in cooperation with the University of Osnabrück, which is located close-by. After implementing the first commercial green laser SLM installation worldwide, the process of 3D printing with copper is now being optimized for series maturity. From powder production to 3D realization to quality testing of prototypes, a future technology is being pioneered that will open new horizons for innovative copper applications.

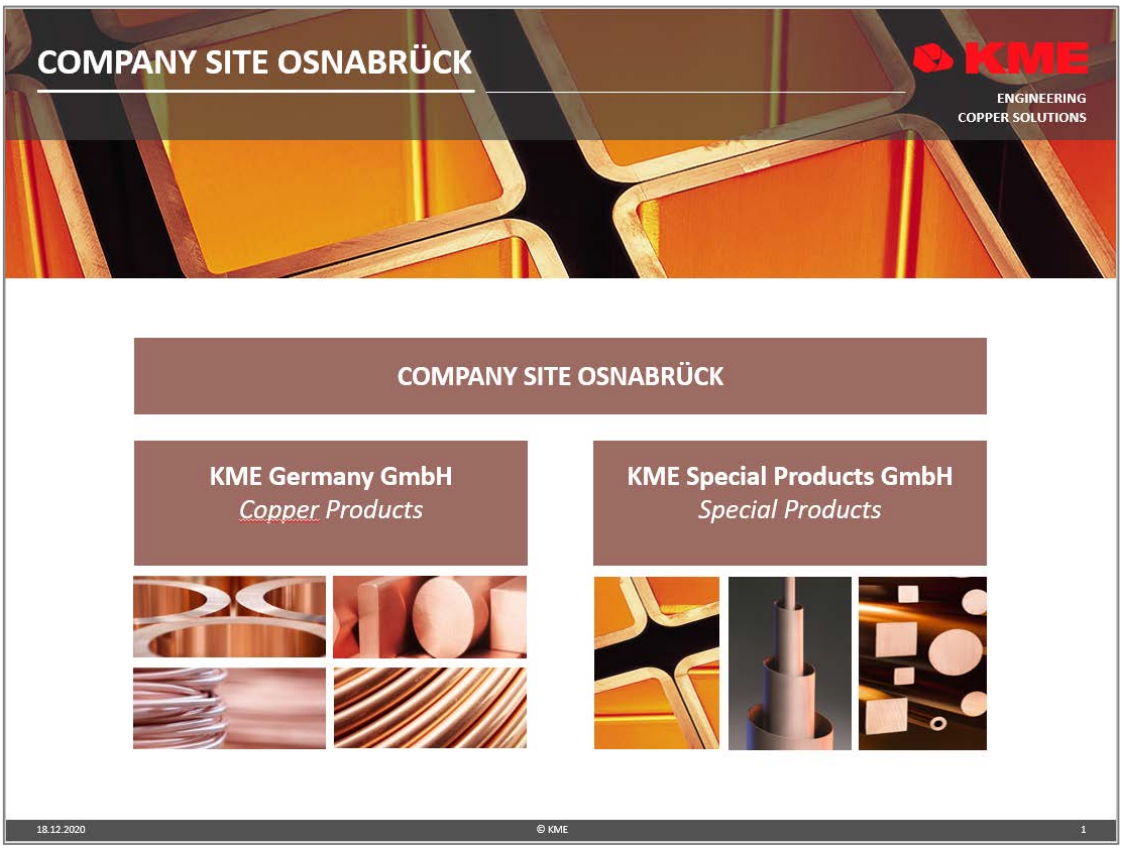


Contact: info-germany@kme.com . Tel +49 (0)541/321-0

THE COMPANY*



COMPANY SITE OSNABRÜCK



DIVISION, OVERVIEW

KME
ENGINEERING
COPPER SOLUTIONS

Division Special Products

Special Products

- Tube moulds, cooling plates and casting wheels for melting and casting
- Extruded special products from rods, bars, profiles and tubes with applications in welding and machining
- Pipes, fittings, flanges, tubes and tube fittings for seawater applications

Division Copper Products

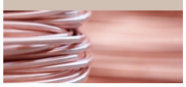
Rolled Products

- Used in the electric and electronics industries, roofing and cladding, auto-motive, renewable energies, power transmission, mechanical industry, minting and telecommunications

Bars

- Flat bars, round bars, square bars and profiles made of copper and low-alloyed copper alloys
- Power engineering, electrical engineering
- Wind power

Wire



- Wires and strands in cables and conductors, railway materials
- Lightning protection/ earthing, Power engineering, Heavy current engineering, Telecommunications, Solar power, Offshore/ submarine cables

Tubes

- Plumbing tubes for sanitary and heating installations
- Copper tubes for air-conditioning & cooling

End Markets

- Steel & Metal Industry, Machine Building, Chemical Industry, Shipbuilding, Offshore
- Construction, mechanical, automotive, renewable energy, architecture
- Switchgear construction, buses, transformers, wind power (onshore/ offshore)
- Automotive, rail, aviation, space travel, Packaging industry
- New building and restoration

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KEY END MARKETS

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KME is well positioned to meet the growing demand in its key end markets

Steel

- #1 globally
- Highly customised products developed in close collaboration with customers and in-house or external research facilities
- ATSM - Advanced Thin Slab Mould plate in field ramp up
- Fibre optical temperature measurement under launch

Automotive

- Copper will experience a higher share in programs
- Stability of board nets will require higher share of copper
- 48V technology requires higher battery stability
- Autonomous driving and digitalization will increase electrical components
- Charging stations will drive copper components

Construction

- Modern roofing and cladding solutions
- Classic sheets and coils are manufactured in state-of-the-art production facilities according to EN 1172 and KME's own strict guidelines
- Plumbing tubes for sanitary and heating installations

Other Industries

- Wide and diverse range of industrial rolled pro-ducts, tubes and special products
- Alloys based on copper-nickel, copper-zinc and copper-aluminium (cladded materials) products highly resistant to the extremely corrosive effects of sea water in the marine industry
- Copper tubes for air-conditioning & cooling

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SMART COPPER METAL OF THE FUTURE

THE 21th CENTURY WILL BE THE „SIGLO DE COBRE“

Copper and its alloys are all-rounders. This non-ferrous metal promotes energy efficiency, electromobility, information technology and much more.

Substance in demand:
By 2050, more than
20%
of copper demand will come from electromobility.
(Source: Fraunhofer Institute)

Valuable vehicle:
The average amount of copper in a vehicle will grow from 24 kg to over
75 kg.

A car is
copper-rich.
Wiring harness 44–50%, contacts, switches, alternator, engine 9.0–12% each. Battery cables, sensors, relays 5.0–6.0% each, DC motors 6.0–10%, chassis parts 4.0–4.5%, drive-train 3.0–4.0%, starter motor 1.0–2.0%.

Fast Internet for all:
Coaxial cables offering up to
5,000 Mbit/s
bandwidth are helping the world grow closer.

Heavy savings:
A tonne of copper used in electrically operated components or regenerative thermal applications can save
200 t. of CO_2
each year.
(Source: European Copper Ecobalance 2012 / copperalliance)

Fresh energy:
Onshore wind power involves up to
six times more
copper than conventional energy generation.

- **Thickness range:** 0.07 – 6.00 mm
  Width range: 10 – 1220 mm

- **Strips**
  - Bare strips
  - Pre tinned strips
    - by hot dip tinning (Strip thickness: 0.10 - 1.20 mm)
    - by electro plating

- **Special qualities**
  - narrow tolerances
  - stress relieved
  - stress annealed

- **Traverse wound strips**
  - drum weight: 300 - 1.500 kg
  - wooden, plastic and metal drums
    - with flange and flange less

- **TEC**STRIP®_multicoil
  - thickness: 0.15 - 0.80 mm
  - width: 15 - 50 mm
  - max. pallet weight: 2.500 kg *

  * higher pallet weights on request

- **Pre stamped-and finish products**

2.2.1. KME OSNABRÜCK (tolerances on width and thickness)

Strip thickness mm	Width tolerance Standard / Precision (mm)				
	10 - 50	51 - 100	101 - 200	201 - 350	351 - 600
0.08 - 1.00	+ 0.20 / + 0.10	+ 0.30 / + 0.20	+ 0.40 / + 0.30	+ 0.60 / + 0.40	+ 1.00 / + 0.50
1.01 - 2.00	+ 0.30 / + 0.20	+ 0.40 / + 0.20	+ 0.50 / + 0.40	+ 1.00 / + 0.60	+ 1.50 / + 0.70
2.01 - 4.00	+ 0.50 / + 0.30	+ 0.60 / + 0.30	+ 0.70 / + 0.50	+ 1.20 / + 0.70	+ 2.00 / + 0.90

Strip thickness mm	Tickness tolerance	
	Standard	Precision
0.08 - 0.20	± 0.005	± 0.004
0.21 - 0.30	± 0.007	± 0.005
0.31 - 0.40	± 0.015	± 0.006
0.41 - 0.50	± 0.015	± 0.008
0.51 - 0.60	± 0.017	± 0.010
0.61 - 0.70	± 0.020	± 0.010
0.71 - 0.85	± 0.022	± 0.012
0.86 - 1.30	± 0.025	± 0.015
1.31 - 2.00	± 0.030	± 0.020
2.01 - 4.00	± 0.045	± 0.025

other tolerances on request

2.2.2. KME MANSFELD (tolerances on width and thickness)

Strip thickness mm	Width tolerance Standard / Precision (mm)				
	10 - 50	51 - 100	101 - 400	401 - 850	851 - 1230
0.08 - 1.00	+ 0.20 / + 0.10	+ 0.20 / + 0.10	+ 0.20 / + 0.10	+ 0.20 / + 0.20	+ 0.20 / + 0.20
1.01 - 2.00	+ 0.30 / + 0.20	+ 0.30 / + 0.20	+ 0.50 / + 0.30	+ 0.50 / + 0.30	+ 1.00 / + 0.70
2.01 - 4.00	+ 0.50 / + 0.25	+ 0.50 / + 0.25	+ 0.50 / + 0.30	+ 0.50 / + 0.50	+ 1.00 / + 0.85
4.01 - 6.00	+ 0.50 / + 0.25	+ 0.50 / + 0.25	+ 0.50 / + 0.35	+ 1.20 / + 1.00	+ 2.00 / + 1.50

Strip thickness mm	Tickness tolerance	
	Standard	Precision
0.08 - 0.20	± 0.005	± 0.004
0.21 - 0.30	± 0.007	± 0.005
0.31 - 0.40	± 0.015	± 0.006
0.41 - 0.50	± 0.015	± 0.008
0.51 - 0.60	± 0.017	± 0.010
0.61 - 0.70	± 0.020	± 0.010
0.71 - 0.85	± 0.022	± 0.012
0.86 - 1.30	± 0.025	± 0.015
1.31 - 2.00	± 0.040	± 0.020
2.01 - 4.00	± 0.050	± 0.030
4.01 - 6.00	± 0.070	± 0.050

other tolerances on request

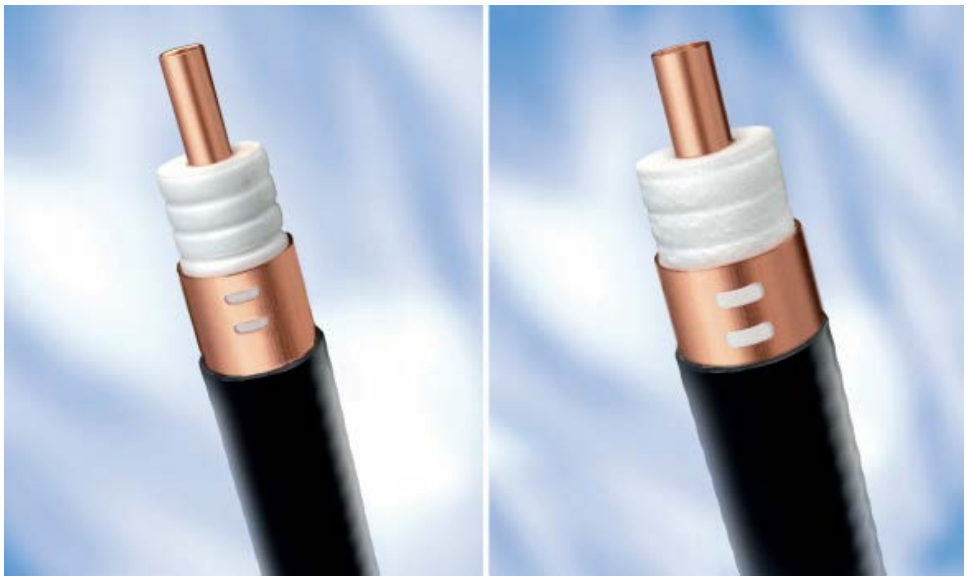
KME STAMPED PARTS FOR THE FAST 5G NET

5G is fast and 5G is essential for data demanding applications that require large amounts of real-time data at high transmission rates such as autonomous driving, artificial intelligence (AI) or smart home applications. It is obvious that this places special demands on KME's high-performance copper materials and their further processing.

In close cooperation with customers and partners from industry, KME manufactures e.g. in its own punching shop perforated strips for the production of radiating cables used in the 5G network. Radiating cables are basically coaxial cables in which slots are punched in the outer conductor, allowing controlled amounts of electromagnetic energy to be radiated and absorbed by the cable.

We produce the copper and copper alloy strips required for this purpose in our own foundry and rolling mill. But our service starts a few steps earlier: we also offer our customers all the steps of the complete process chain from consulting to material selection, the best possible production process adapted to the material, surface finishing, packaging, automation, coupling to subsequent processes in production, material recycling and metal handling.

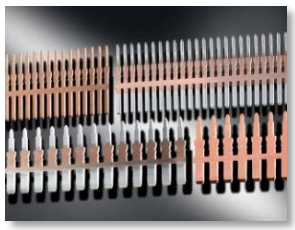
Always under the motto "everything from a single source", the production cycle is closed; interfaces are saved, effort and above all costs are minimised - important factors in an increasingly demanding competitive environment. This makes KME the ideal partner when it comes to sophisticated stamped, contact and bent parts as well as the production of entire assemblies.



Contact: info-stanztechnik@kme.com . Tel +49 (0)541/321-3520 . Tel +49 (0)541/321-3540

- When it comes to high-quality stamped and formed parts with maximum precision at a high technical level, we are your partner. .

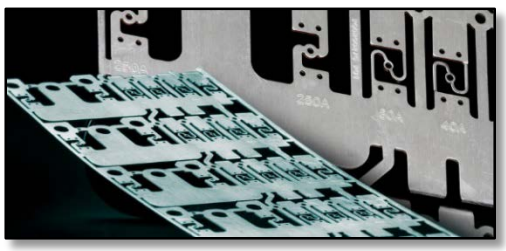
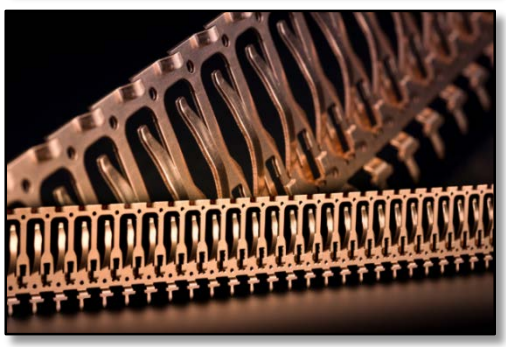
- We offer fully integrated manufacturing chain
  - Advice on materials
  - Hot Dip Tinned, electro plated- and coating of stamped parts
  - Manufacturing of stamped parts especially for material-intensive products
  - Recycling of stamping parts
  - Metal management


- We will send you an overall concept tailored to your needs

- As a licensee in press-fit technology using EloPin®, KME most recently offers this connection technology for high-quality solderless and gas-tight electrical connections in the field of PCB contacting with plug-in connectors.

- Stamping maschines with 50 – 300t press force
- Strip thickness up to 5 mm
- Tool size up to 2.5 m length
- Integrated processes a.e.
  - press in from bolts and nuts
  - joining of components
- Small and large batch production
- Customised packaging
- Tool construction and tool maintenance
- Stamping of all common metals
- Technical and sales support for customers
- Project management
- Quality management system accredited to IATF 16949

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C11000

3.1. Cu-ETP

Alloy Designation	
EN	Cu-ETP
DIN CEN/TS 13388	CW004A
UNS	C11000

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.

Chemical Composition (Balance) Weight percentage		
Cu	≥ 99.90	%
O	≤ 0.040	%

Main Applications

Electrical: Transformer Coils, Switches, Terminals, Contacts, Radio Parts, Busbars, Terminal Connectors, Conductors, Stranded Conductors, Cable Strip
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

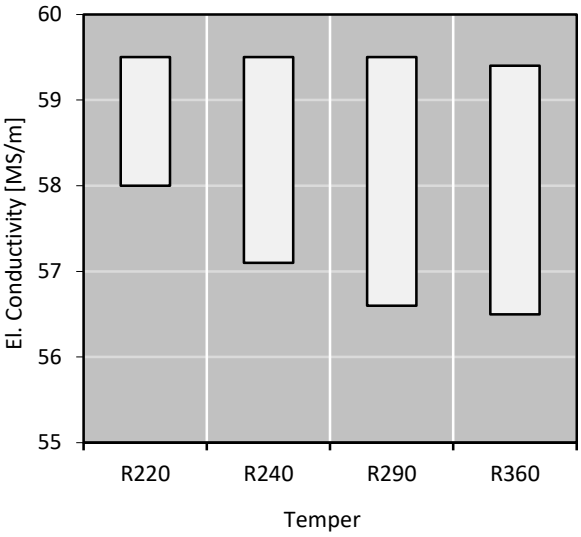
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bendability 90° gw rel. Bending radius R/T	Bendability 90° bw rel. Bending radius R/T
	MPa	MPa	%	HV	Strip thickness ≤ 0.50mm	
R220	220 .. 260	≤ 140 *	33	40 .. 65	0	0
R240	240 .. 300	180	8	65 .. 95	0	0
R290	290 .. 360	250	4	90 .. 110	0	0.5
R360	≥ 360	320	2	≥ 110	1	2

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.92	g/cm³
Thermal expansion coefficient	20 .. 300 °C	17.7	10^{-6}/K
Specific heat capacity		0.394	J/(g·K)
Thermal conductivity		394	W/(m·K)
Electrical conductivity	MS/m	58	MS/m
Electrical conductivity	IACS	100	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	3.7	10^{-3}/K
Modulus of elasticity	GPa	130	GPa

Elektrical Conductivity



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

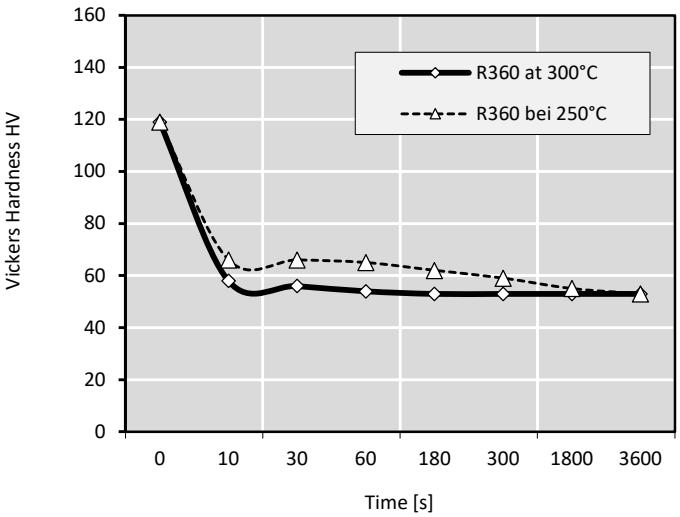
During heating in reducing atmosphere hydrogen can penetrate inside the copper and react with Cu-Oxide to water vapour. Its pressure can cause embrittlement.

* For more details call our technical service

Corrosion Restistance *

Practically resistant against stress corrosion cracking.

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C10300

3.2. Cu-HCP

Alloy Designation	
EN	Cu-HCP
DIN CEN/TS 13388	CW021A
UNS	C10300

Characteristics

Cu-HCP is a high purity, low level residual phosphorus, deoxidized copper. It has a very high electrical and thermal conductivity, good welding and soldering properties as well as resistance to hydrogen. It has excellent hot and cold forming properties, and a good corrosion resistance in water and especially in atmosphere (including industrial atmosphere).

Main Applications

Electrical: High Frequency Cable, Submarine Cable Strips, Wave Guide Tubing, Standard material for longitudinally welded cables, Commutators, Applications Requiring High Conductivity, Tubular Bus, Electrical Conductors, Clad Products, Busbars, Terminals, Thermostatic Control Tubing

Industrial: Applications Requiring Good Brazing, Applications Requiring Good Weldability, Pressure Vessels, Billet Mold Tube, Extrusion Cans for Powder Metallurgy

Chemical Composition (Balance) Weight percentage		
Cu	≥ 99.95	%
P	≤ 0.004	%

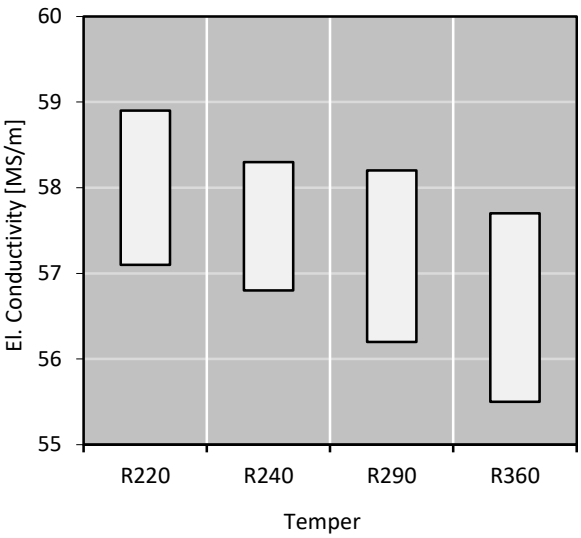
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw rel. Bending Radius R/T	Bending 90° bw rel. Bending Radius R/T
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R220	220 .. 260	≤ 140 *	33	40 .. 65	0	0
R240	240 .. 300	180	8	65 .. 95	0	0
R290	290 .. 360	250	4	90 .. 110	0	0
R360	≥ 360	320	2	≥ 110	0	0.5

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.92	g/cm³
Thermal expansion coefficient	20 .. 300 °C	16.9	10^{-6}/K
Specific heat capacity		0.385	J/(g·K)
Thermal conductivity		385	W/(m·K)
Electrical conductivity	MS/m	57	MS/m
Electrical conductivity	IACS	98	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	3.7	10^{-3}/K
Modulus of elasticity	GPa	130	GPa

Electrical Conductivity



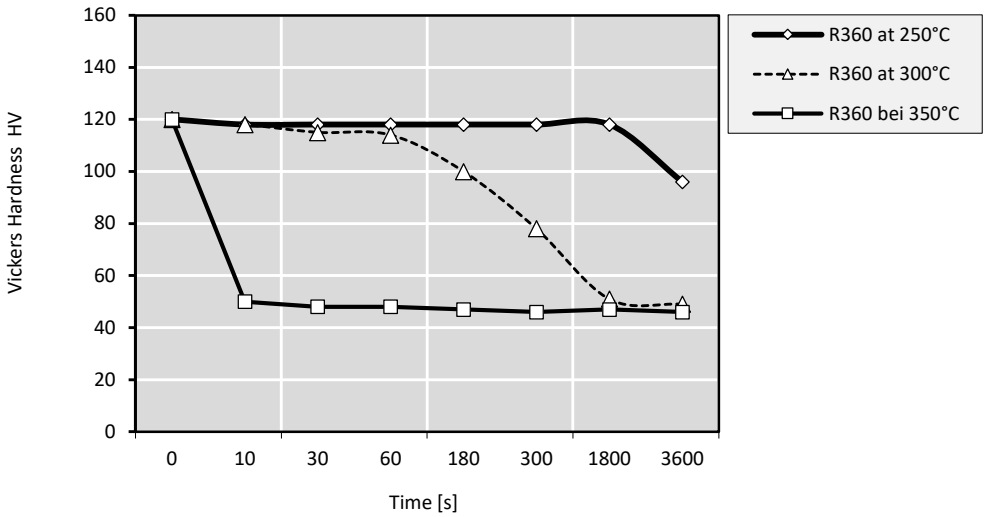
Fabrication Properties *	
Cold Forming Properties	Excellent
Machinability (Rating 20)	Less suitable
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding (Spot / But)	Less suitable / Good
Gas Shielded Arc Welding	Excellent
Laser Welding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

* For more details call our technical service

Corrosion Resistance *

Insensible to stress corrosion cracking.

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C10300

3.3. Cu-PHC

Alloy Designation	
EN	Cu-PHC
DIN CEN/TS 13388	CW020A
UNS	C10300

Characteristics

Cu-PHC is a high purity, low level residual phosphorus, deoxidized copper. It has a very high electrical and thermal conductivity, good welding and soldering properties as well as resistance to hydrogen. It has excellent hot and cold forming properties, and a good corrosion resistance in water and especially in atmosphere (including industrial atmosphere).
Cu-PHC has a higher conductivity than Cu-HCP.

Main Applications

Electrical: High Frequency Cable, Submarine Cable Strips, Wave Guide Tubing, Standard material for longitudinally welded cables, Commutators, Applications Requiring High Conductivity, Tubular Bus, Electrical Conductors, Clad Products, Busbars, Terminals, Thermostatic Control Tubing

Industrial: Applications Requiring Good Brazing, Applications Requiring Good Weldability, Pressure Vessels, Billet Mold Tube, Extrusion Cans for Powder Metallurgy

Chemical Composition (Balance) Weight percentage		
Cu	≥ 99.95	%
P	≤ 0.003	%

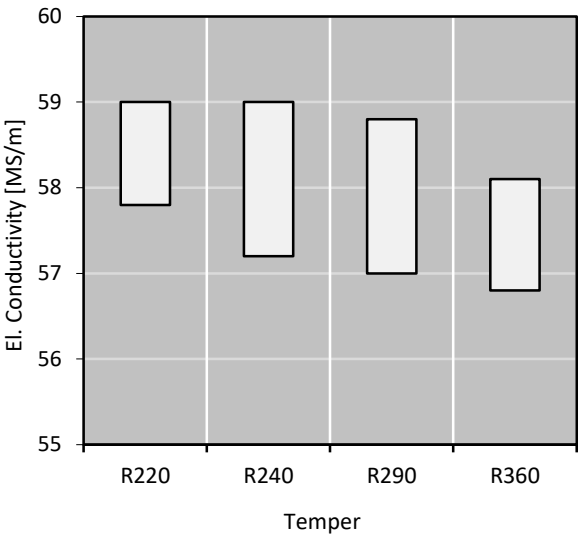
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° rel. Bending Radius R/T gw	bw
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R220	220 .. 260	≤ 140 *	33	40 .. 65	0	0
R240	240 .. 300	180	8	65 .. 95	0	0
R290	290 .. 360	250	4	90 .. 110	0	0
R360	≥ 360	320	2	≥ 110	0	0.5

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.92	g/cm³
Thermal expansion coefficient	20 .. 300 °C	17.7	10^{-6}/K
Specific heat capacity		0.385	J/(g·K)
Thermal conductivity		385	W/(m·K)
Electrical conductivity	MS/m	58	MS/m
Electrical conductivity	IACS	100	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	3.7	10^{-3}/K
Modulus of elasticity	GPa	130	GPa

Electrical Conductivity



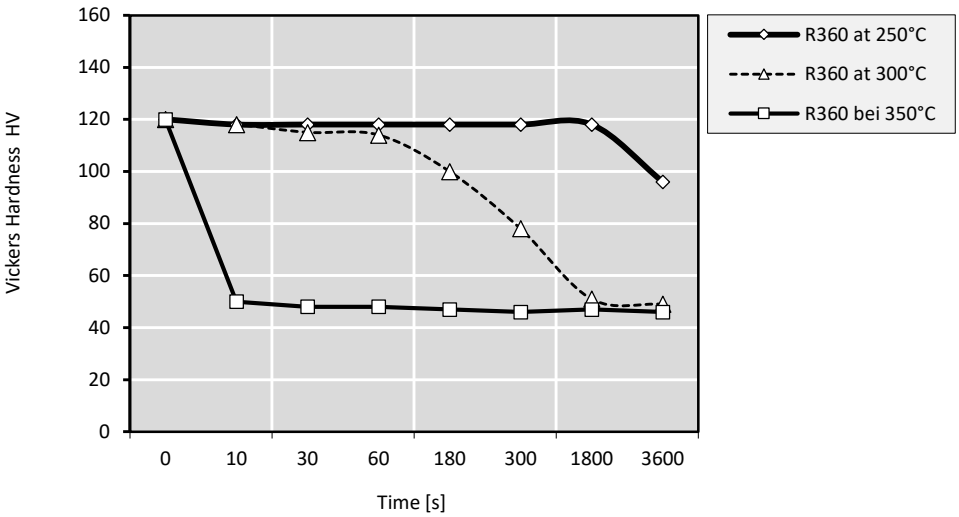
Fabrication Properties *	
Cold Forming Properties	Excellent
Machinability (Rating 20)	Less suitable
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding (Spot / But)	Less suitable / Good
Gas Shielded Arc Welding	Excellent
Laser Welding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

* For more details call our technical service

Corrosion Resistance *

Insensible to stress corrosion cracking.

Softening Resistance



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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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C12000

3.4. Cu-DLP

Alloy Designation	
EN	Cu-DLP
DIN CEN/TS 13388	CW023A
UNS	C12000

Characteristics

Cu-DLP is a phosphorus-deoxidized copper with a limited, medium amount of residual Phosphorus. It has a good electrical conductivity and excellent welding and soldering properties. It can be formed excellent, either hot or cold.

Chemical Composition (Balance) Weight percentage		
Cu	≥ 99.90	%
P	0.005 - 0.012	%

Main Applications

Electrical: Cable Strip, Busbars (Welded or Brazed), Tubular Bus, Leadframes for power semiconductors.

Industrial: Tubing, LP Gas Service, Conductors, Resistance Welding Equipment, Welded Tube, Medical Gas-Oxygen.

Oher: Applications Requiring Welding or Brazing, Apparatus industry.

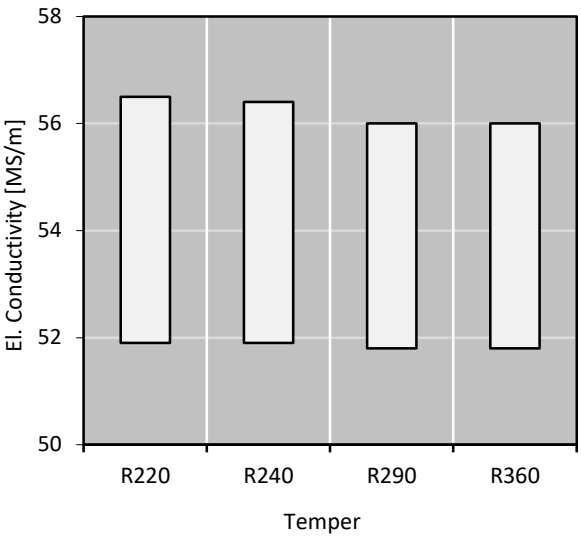
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw rel. Bending Radius R/T	Bending 90° bw rel. Bending Radius R/T
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R220	220 .. 260	≤ 140 *	33	40 .. 65	0	0
R240	240 .. 300	180	8	65 .. 95	0	0
R290	290 .. 360	250	4	90 .. 110	0	0
R360	≥ 360	320	2	≥ 110	0	0.5

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.94	g/cm³
Thermal expansion coefficient	20 .. 300 °C	17.3	10^{-6}/K
Specific heat capacity		0.386	J/(g·K)
Thermal conductivity		375	W/(m·K)
Electrical conductivity	MS/m	55	MS/m
Electrical conductivity	IACS	95	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	3.6	10^{-3}/K
Modulus of elasticity	GPa	130	GPa

Electrical Conductivity



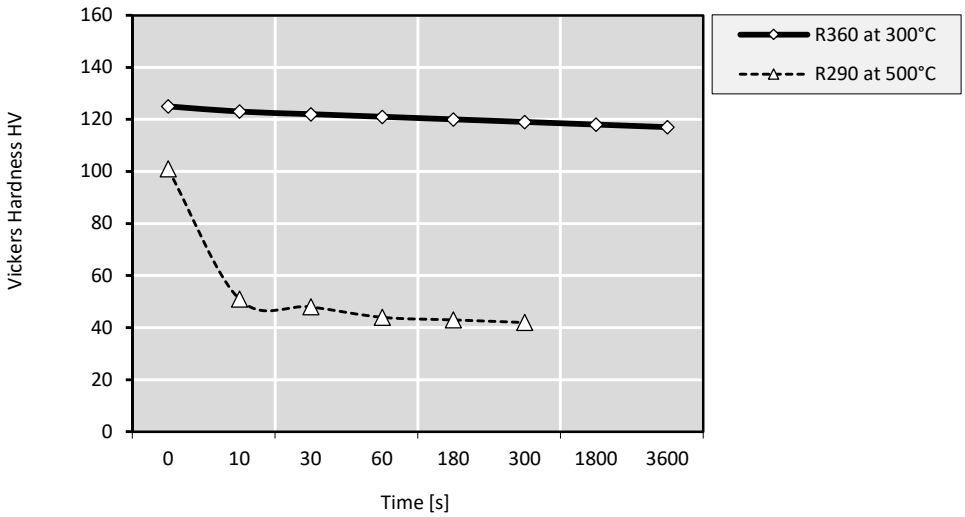
Fabrication Properties *	
Cold Forming Properties	Excellent
Machinability (Rating 20)	Less suitable
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding	Less suitable
Gas Shielded Arc Welding	Excellent
Laser Welding	Fair

* For more details call our technical service

Corrosion Resistance *

Practically resistant against stress corrosion cracking.

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

CuAg0,1P

3.5. CW016A

Alloy Designation	
EN	Cu-AG0.1P
DIN CEN/TS 13388	CW016A
UNS	C10700 *

* difference in chemical composition

Characteristics

CuAg0.10P is a phosphorus-deoxidized copper with a limited, low amount of residual phosphorus. The silver content improves softening resistance a lot by maintaining high conductivity and allows applications at elevated temperatures.

CuAg0.10P from KME has an excellent electrical conductivity and excellent welding and soldering properties. It can be formed excellent, either hot or cold.

Chemical Composition (Balance) Weight percentage		
Cu	Rest	%
Ag	0.1	%
P	≈ 0.003	%

Main Applications

Electrical: Commutator Segments, Terminal Connectors, Busbars, Conductivity Wire, Contacts, Windings, Switches, Transistor Bases, Conductors, Radio Parts, Printed Circuit Foil, Coaxial Cable.

Industrial: Chemical Process Equipment, Printing Rolls, Clad Metals, Heat Exchangers, Applications Requiring Brazing in Hydrogen Atmosphere.

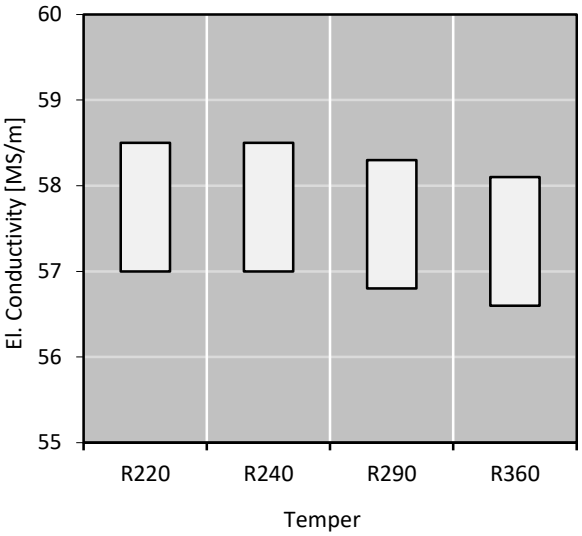
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw rel. Bending Radius R/T	Bending 90° bw rel. Bending Radius R/T
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R220	220 .. 260	≤ 140 *	33	40 .. 65	0	0
R240	240 .. 300	180	8	65 .. 95	0	0
R290	290 .. 360	250	4	90 .. 110	0	0
R360	≥ 360	320	2	≥ 110	0	0.5

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.94	g/cm³
Thermal expansion coefficient	20 .. 300 °C	17.3	10^{-6}/K
Specific heat capacity		0.386	J/(g·K)
Thermal conductivity		375	W/(m·K)
Electrical conductivity	MS/m	56	MS/m
Electrical conductivity	IACS	96	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	3.7	10^{-3}/K
Modulus of elasticity	GPa	130	GPa

Elektrische Leitfähigkeit



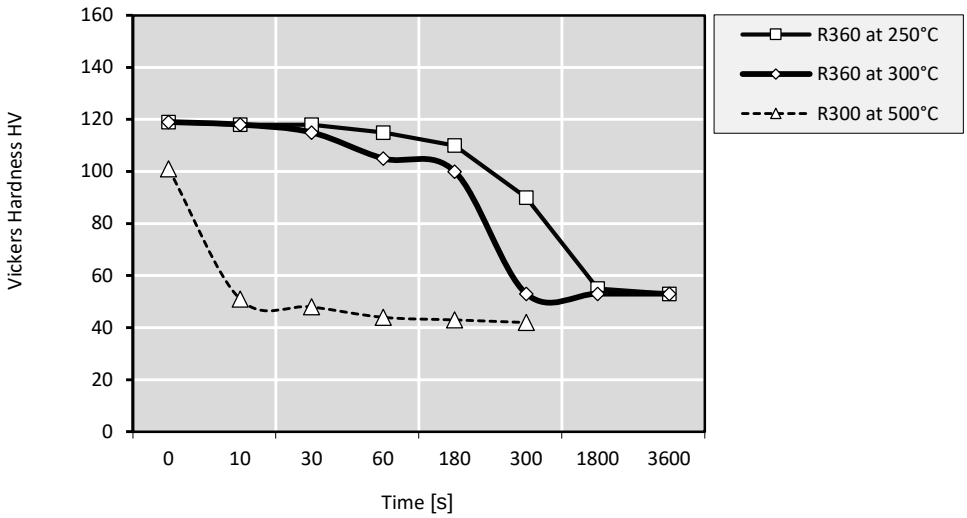
Fabrication Properties *	
Cold Forming Properties	Excellent
Machinability (Rating 20)	Less suitable
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding	Less suitable
Gas Shielded Arc Welding	Good
Laser Welding	Less suitable

*Für weitere Einzelheiten rufen Sie unseren technischen Dienst an

Corrosion Resistance *

Practically resistant against stress corrosion cracking.

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.

Available delivery forms *

- Strips in coils
- Traverse-wound coils with drum weights up to 1.5 t
- **TEC**STRIP®_multicoil up to 2.5 t
- Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C12200

3.6. Cu-DHP

Alloy Designation	
EN	Cu-DHP
DIN CEN/TS 13388	CW024A
UNS	C12200

Characteristics

Cu-DHP is a phosphorus-deoxidized copper with a limited, high amount of residual Phosphorus. It has excellent welding and soldering properties and is resistant against hydrogen embrittlement. It can be deformed excellent, either hot or cold.

Chemical Composition (Balance) Weight percentage		
Cu	≥ 99.90	%
P	0.015 - 0.040	%

Main Applications

Electrical: Wire Connectors, Heater Elements

Industrial: Construction, Rotating Bands, Kettles, Anodes for Electroplating, Heat Exchanger Shells, Oil Coolers in Airplanes, Tanks, Casting Molds, LP Gas Service, Medical Gas-Oxygen, Plating Anodes, Plating Racks, Plating Hangers, Marine Oil Coolers

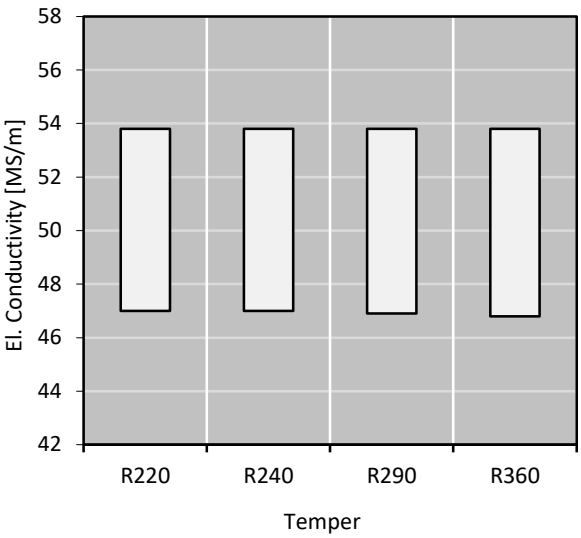
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw rel. Bending Radius R/T	Bending 90° bw rel. Bending Radius R/T
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R220	220 .. 260	≤ 140 *	33	40 .. 65	0	0
R240	240 .. 300	180	8	65 .. 95	0	0
R290	290 .. 360	250	4	90 .. 110	0	0
R360	≥ 360	320	2	≥ 110	0	0.5

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.94	g/cm³
Thermal expansion coefficient	20 .. 300 °C	17.7	10^{-6}/K
Specific heat capacity		0.386	J/(g·K)
Thermal conductivity		330	W/(m·K)
Electrical conductivity	MS/m	47	MS/m
Electrical conductivity	IACS	81	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	3.4	10^{-3}/K
Modulus of elasticity	GPa	130	GPa

Electrical Conductivity

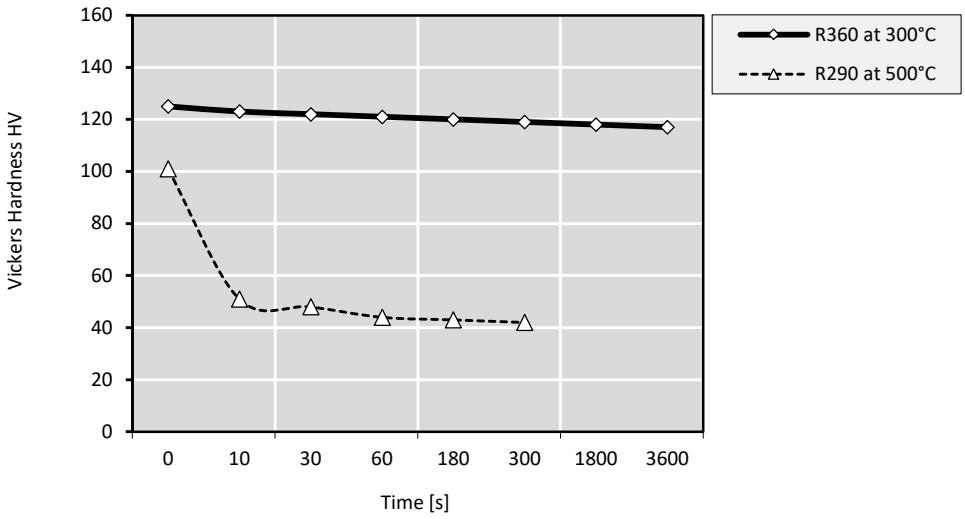


Fabrication Properties *	
Cold Forming Properties	Excellent
Machinability (Rating 20)	Less suitable
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding	Less suitable
Gas Shielded Arc Welding	Excellent
Laser Welding	Good

* For more details call our technical service

Corrosion Resistance *
Insensible to stress corrosion cracking

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C10200

3.7. Cu-OF

Alloy Designation	
EN	Cu-OF
DIN CEN/TS 13388	CW008A
UNS	C10200

Characteristics

Cu-OF is a high purity, oxygen free, non phosphorus-deoxidized copper that does not contain in vacuum evaporating elements. It has a very high electrical and thermal conductivity, good welding and excellent soldering properties. It has excellent hot and cold forming properties, and a good corrosion resistance, especially in atmosphere due to a good adherence of the oxide layer.

Main Applications

Automotive: Automotive Rectifiers

Electrical: Transistor Component Bases, High Resistance-Ratio Cryogenic Shunts, Bus Conductors, Wave Guides, Hollow Conductors, Anodes for Vacuum Tubes, Coaxial Cable, Waveguides, High Frequency Cable, Submarine Cable, Coaxial Tube, Klystrons, Microwave Tubes, Bus Bars, Lead-in Wire, Vacuum Seals, Conductors, Glass-to-Metal Seals, Lead frames for semiconductors, Heat sinks.

Chemical Composition (Balance) Weight percentage		
Cu	≥ 99.95	%

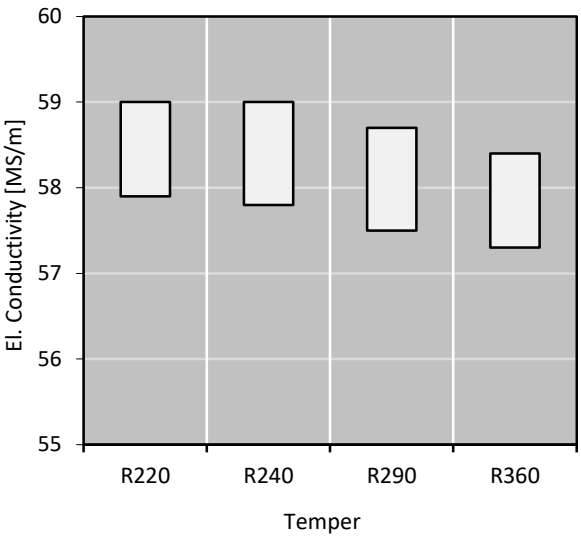
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw	Bending 90° bw
					rel. Bending Radius R/T	
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R220	220 .. 260	≤ 140 *	33	40 .. 65	0	0
R240	240 .. 300	180	8	65 .. 95	0	0
R290	290 .. 360	250	4	90 .. 110	0	0
R360	≥ 360	320	2	≥ 110	0	0.5

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.93	g/cm³
Thermal expansion coefficient	20 .. 300 °C	17.7	10^{-6}/K
Specific heat capacity		0.39	J/(g·K)
Thermal conductivity		394	W/(m·K)
Electrical conductivity	MS/m	58	MS/m
Electrical conductivity	IACS	100	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	3.81	10^{-3}/K
Modulus of elasticity	GPa	130	GPa

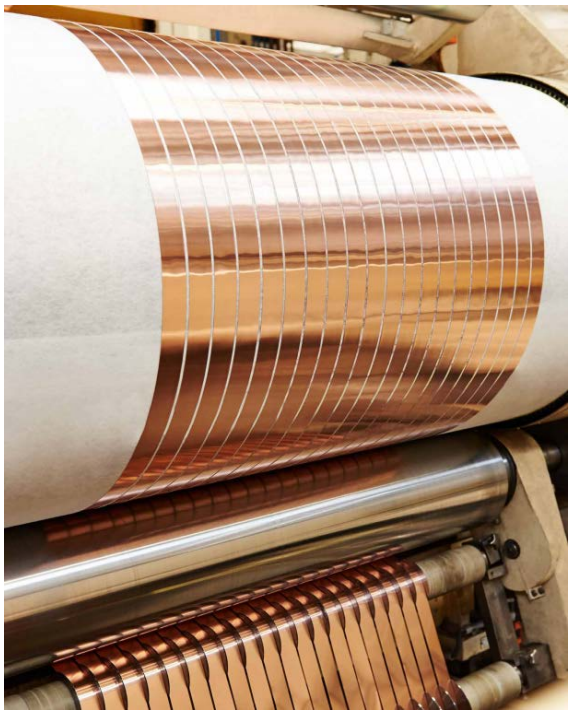
Electrical Conductivity



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

* For more details call our technical service

Corrosion Resistance *
Practically resistant against stress corrosion cracking



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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C10100

3.8. Cu-OFE

Alloy Designation	
EN	Cu-OFE
DIN CEN/TS 13604	CW009A
UNS	C10100

Characteristics

Cu-OFE is a high-purity, oxygen-free copper, that does not contain elements that can vaporise in a vacuum environment. It is very thermally and electrically conductive and it also performs extremely well during hot and cold forming. Cu-OFE is corrosion-resistant, especially against atmospheric influences and water, and is also insensitive to stress corrosion cracking.

Chemical Composition (Balance) Weight percentage		
Cu	≥ 99.99	%

Main Applications

Cu-OFE is a popular material in electrical engineering, vacuum engineering and the production of high-frequency cables.

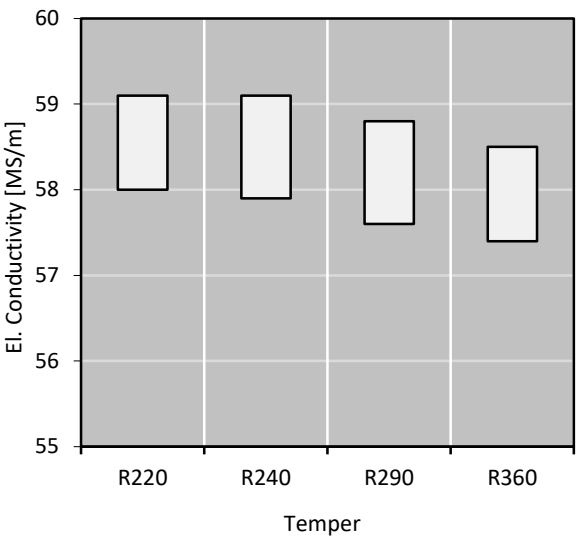
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw	Bending 90° bw
					rel. Bending Radius R/T	
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R220	220 .. 260	≤ 140 *	33	40 .. 65	0	0
R240	240 .. 300	180	8	65 .. 95	0	0
R290	290 .. 360	250	4	90 .. 110	0	0
R360	≥ 360	320	2	≥ 110	0	0.5

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.93	g/cm³
Thermal expansion coefficient	20 .. 300 °C	17.7	10^{-6}/K
Specific heat capacity		0.39	J/(g·K)
Thermal conductivity		394	W/(m·K)
Electrical conductivity	MS/m	58.6	MS/m
Electrical conductivity	IACS	101	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	3.81	10^{-3}/K
Modulus of elasticity	GPa	130	GPa

Electrical Conductivity

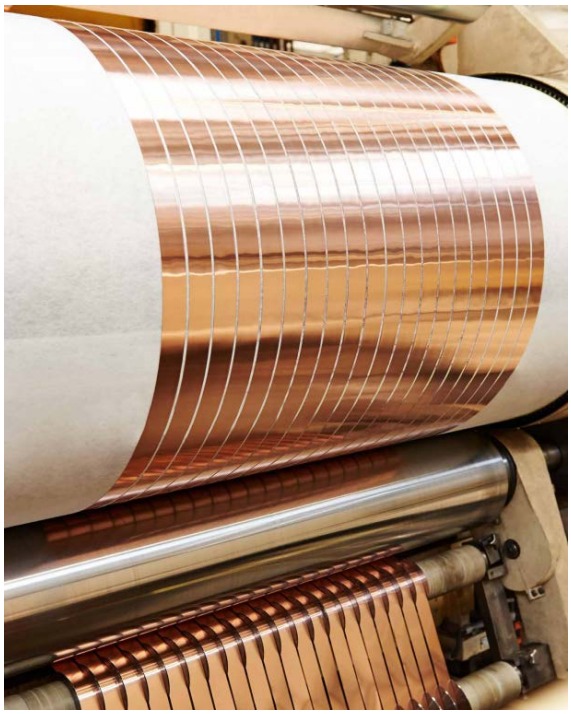


Fabrication Properties *	
Cold Forming Properties	Excellent
Machinability (Rating 20)	Less suitable
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding	Less suitable
Gas Shielded Arc Welding	Excellent
Laser Welding	Fair

* For more details call our technical service

Corrosion Resistance *

Cu-OFE is highly corrosion resistant in a natural atmosphere, including sea air environments. It also performs well in industrial and commercial environments, for example for drinking and industrial water, mild alkaline solutions (without oxidants) and with pure water vapour. CU-OFE is also resistant to non-oxidising acids and heat treatments in reducing atmospheres.



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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C22000

4.1. CuZn10

Alloy Designation	
EN	CuZn10
DIN CEN/TS 13388	CW501L
UNS	C22000

Chemical Composition (Balance) Weight percentage		
Cu	90	%
Zn	Rest	%

Characteristics

CuZn10 has very good cold forming properties and is well suited for e.g. coinage, beating, embossing. This alloy has a higher strength as pure copper. It has good welding and brazing properties as well as a good corrosion resistant and is not fragile to stress corrosion and dezincification. **CuZn10** is principally used in jewellery, metal goods, watch industry and in electronic industry for installation parts.

Main Applications

Jewellery and metal good, Components for the electrical industry.

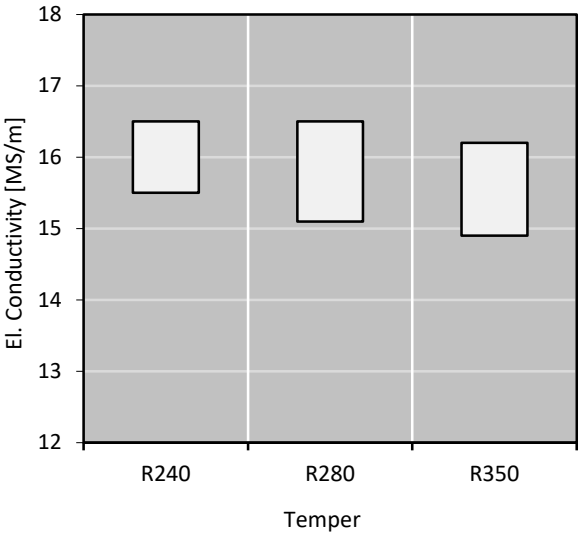
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw rel. Bending Radius R/T	Bending 90° bw rel. Bending Radius R/T
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R240	240 .. 290	≤ 140 *	36	50 .. 100	0	0
R280	280 .. 360	200 *	13	80 .. 130	0	0
R350	350 .. 450	290 *	4	110 .. 160	-	-

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.80	g/cm³
Thermal expansion coefficient	20 .. 300 °C	18.2	10^{-6}/K
Specific heat capacity		0.376	J/(g·K)
Thermal conductivity		184	W/(m·K)
Electrical conductivity	MS/m	25	MS/m
Electrical conductivity	IACS	43	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	1.8	10^{-3}/K
Modulus of elasticity	GPa	124	GPa

Electrical Conductivity



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

* For more details call our technical service

Corrosion Resistance *

CuZn10 has good resistance to: Fresh water, neutral or alkaline saline Solutions, organic compounds as well as land, sea, and industrial atmosphere.

Not resistant to: acids, hydrous sulphur compounds, hydrous ammonia in the non-stress-relieved condition. Low sensitivity to stress corrosion cracking.

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C23000

4.2. CuZn15

Alloy Designation	
EN	CuZn15
DIN CEN/TS 13388	CW502L
UNS	C23000

Chemical Composition (Balance) Weight percentage		
Cu	85	%
Zn	Rest	%

Characteristics

CuZn15 has very good cold forming properties and is well suited for e.g. coinage, beating, embossing. This alloy has a higher strength as pure copper. It has good welding and brazing properties as well as a good corrosion resistant and is not fragile to stress corrosion and dezincification. **CuZn15** is principally used in jewellery, metal goods, watch industry and in electronic industry for installation parts.

Main Applications

Jewellery and metal good, Components for the electrical industry, Cladding Panels.

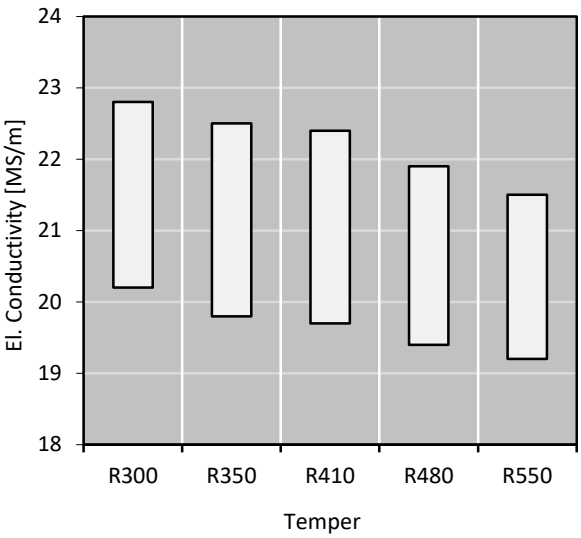
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw rel. Bending Radius R/T	Bending 90° bw rel. Bending Radius R/T
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R300	300 .. 370	≤ 170 *	16	85 .. 120	0	0
R350	350 .. 420	270 *	8	100 .. 150	0	0
R410	410 .. 490	360 *	3	125 .. 155	0	1
R480	480 .. 560	420 *	1	150 .. 180	1	3
R550	≥ 550	480 *	-	≥ 170	-	-

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.75	g/cm³
Thermal expansion coefficient	20 .. 300 °C	18.5	10^{-6}/K
Specific heat capacity		0.377	J/(g·K)
Thermal conductivity		159	W/(m·K)
Electrical conductivity	MS/m	20	MS/m
Electrical conductivity	IACS	34	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	2.6	10^{-3}/K
Modulus of elasticity	GPa	122	GPa

Electrical Conductivity



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

* For more details call our technical service

Corrosion Resistance *

CuZn15 has in general a good resistance to natural-, sea- and industrial atmosphere, water, water vapour, different saline solutions, many organic liquids, neutral- and alkaline bonds.

CuSn15 has a low sensitivity to stress corrosion cracking. To avoid stress corrosion as much as possible, the alloy should be used in a stress relieved temper.
CuSn15 is not sensitive to dezincification, that could occur in water with high clorine content and low carbonat-hardness.

Not resistant to: Oxidizing acids, hydrous sulphur components, hydrous ammonia in the non-stress-relieved condition.

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C26000

4.3. CuZn30

Alloy Designation	
EN	CuZn30
DIN CEN/TS 13388	CW505L
UNS	C26000

Characteristics

CuZn30 combines 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 CuZn30 called “deep-draw” or “cartridge” brass.

Chemical Composition (Balance) Weight percentage		
Cu	70	%
Zn	Rest	%

Main Applications

Terminal Connectors, Flashlight Shells, Lamp Fixtures, Reflectors, Screw Shells, Fasteners, Electrical Sockets, Lamps.

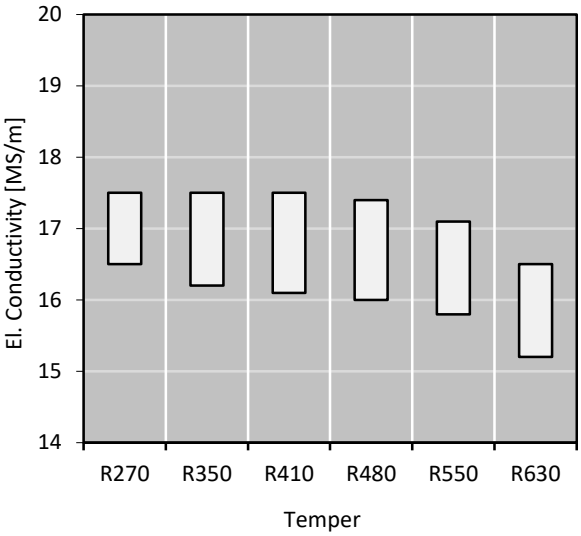
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw	Bending 90° bw
					rel. Bending Radius R/T	
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R270	270 .. 350	≤ 170 *	40	55 .. 105	0	0
R350	350 .. 430	270 *	21	95 .. 125	0	0
R410	410 .. 490	350 *	9	120 .. 180	0	1
R480	480 .. 570	430 *	4	150 .. 190	0,5	2
R550	550 .. 640	480 *	2	170 .. 210	1	3
R630	≥ 630	560 *	-	≥ 190	-	-

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.53	g/cm³
Thermal expansion coefficient	20 .. 300 °C	19.7	10^{-6}/K
Specific heat capacity		0.377	J/(g·K)
Thermal conductivity		126	W/(m·K)
Electrical conductivity	MS/m	16	MS/m
Electrical conductivity	IACS	28	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	1.5	10^{-3}/K
Modulus of elasticity	GPa	115	GPa

Electrical Conductivity



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

* For more details call our technical service

Corrosion Resistance *

CuZn30 has a good resistance to water, water vapour, different saline solutions, many organic liquids. Industrial-, maritime- and country air.

CuSn30 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.

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C26800

4.4. CuZn33

Alloy Designation	
EN	CuZn33
DIN CEN/TS 13388	CW506L
UNS	C26800

Characteristics

CuZn33 combines 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 CuZn30 called “deep-draw” or “cartridge” brass.

Chemical Composition (Balance) Weight percentage		
Cu	67	%
Zn	Rest	%

Main Applications

Metal goods, Deep drawn parts, Components for the electrical industry, stamped parts, Connectors.

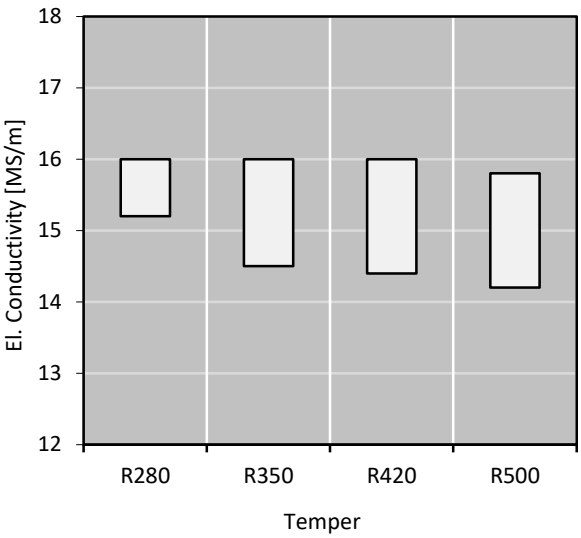
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw	Bending 90° bw
					rel. Bending Radius R/T	
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R280	280 .. 380	≤ 170 *	44	55 .. 95	0	0
R350	350 .. 430	170 *	23	95 .. 125	0	0
R420	420 .. 500	300 *	6	125 .. 155	0	0
R500	≥ 500	450 *	3	≥ 155	0,5	0,5

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.47	g/cm³
Thermal expansion coefficient	20 .. 300 °C	19.9	10^{-6}/K
Specific heat capacity		0.377	J/(g·K)
Thermal conductivity		121	W/(m·K)
Electrical conductivity	MS/m	15	MS/m
Electrical conductivity	IACS	26	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	1.6	10^{-3}/K
Modulus of elasticity	GPa	112	GPa

Electrical Conductivity



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

* For more details call our technical service

Corrosion Resistance *

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

CuSn33 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.

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C27000

4.5. CuZn36

Alloy Designation	
EN	CuZn36
DIN CEN/TS 13388	CW507L
UNS	C27000

Chemical Composition (Balance) Weight percentage		
Cu	64	%
Zn	Rest	%

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

Metal goods, Deep drawn parts, Stamped parts, Connectors.

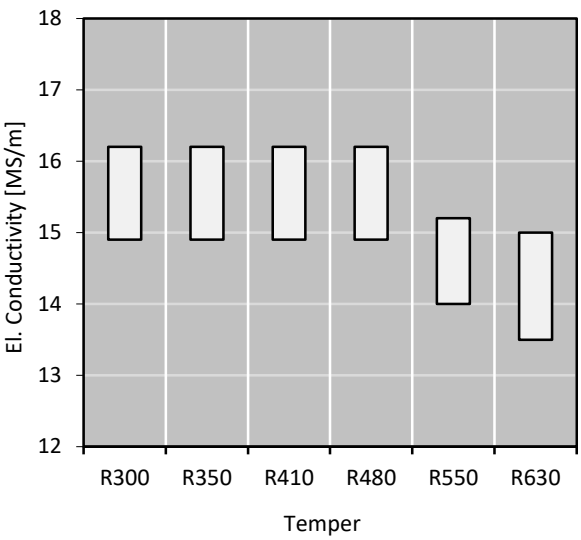
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw	Bending 90° bw
					rel. Bending Radius R/T	
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R300	300 .. 370	≤ 180 *	38	55 .. 105	0	0
R350	350 .. 430	170 *	19	95 .. 125	0	0
R410	410 .. 490	300 *	8	120 .. 155	0	0
R480	480 .. 560	430 *	3	150 .. 180	0,5	2
R550	≥ 550	500 *	-	≥ 170	1	3
R630	≥ 630	600 *	-	≥ 190	-	-

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.47	g/cm³
Thermal expansion coefficient	20 .. 300 °C	20.2	10^{-6}/K
Specific heat capacity		0.377	J/(g·K)
Thermal conductivity		121	W/(m·K)
Electrical conductivity	MS/m	14	MS/m
Electrical conductivity	IACS	24	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	1.7	10^{-3}/K
Modulus of elasticity	GPa	110	GPa

Electrical Conductivity



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

* For more details call our technical service

Corrosion Resistance *

CuZn36 has a good resistance to water, water vapour, different saline solutions, many organic liquids .
Land, sea and industrial atmosphere.

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.

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C27200

4.6. CuZn37

Alloy Designation	
EN	CuZn37
DIN CEN/TS 13388	CW508L
UNS	C27200

Chemical Composition (Balance) Weight percentage		
Cu	63	%
Zn	Rest	%

Characteristics

CuZn37 is the major brass alloy for the cold forming process. Even though brasses with lower Zinc content have better cold forming properties, **CuZn37** 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

Metal goods, Deep drawn parts, Stamped parts, Connectors.

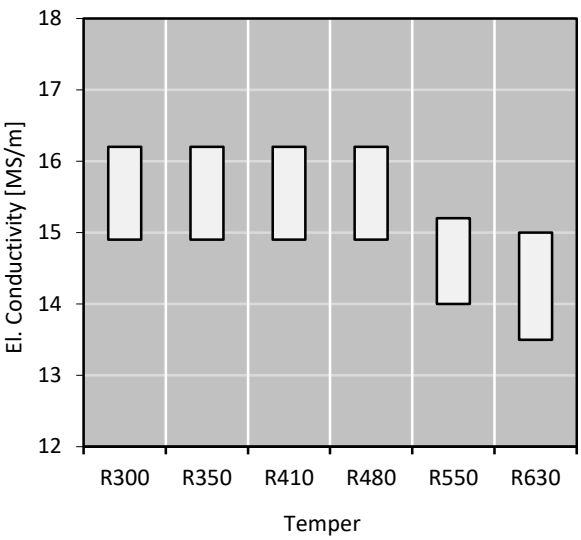
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw	Bending 90° bw
					rel. Bending Radius R/T	
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R300	300 .. 370	≤ 180 *	38	55 .. 105	0	0
R350	350 .. 430	170 *	19	95 .. 125	0	0
R410	410 .. 490	300 *	8	120 .. 155	0	0
R480	480 .. 560	430 *	3	150 .. 180	0,5	2
R550	≥ 550	500 *	-	≥ 170	1	3
R630	≥ 630	600 *	-	≥ 190	-	-

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.47	g/cm³
Thermal expansion coefficient	20 .. 300 °C	20.2	10^{-6}/K
Specific heat capacity		0.377	J/(g·K)
Thermal conductivity		121	W/(m·K)
Electrical conductivity	MS/m	14	MS/m
Electrical conductivity	IACS	24	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	1.7	10^{-3}/K
Modulus of elasticity	GPa	110	GPa

Electrical Conductivity



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

* For more details call our technical service

Corrosion Resistance *

CuZn37 has a good resistance to water, water vapour, different saline solutions, many organic liquids .
Land, sea and industrial atmosphere.

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.

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C51100

5.1. CuSn4

Alloy Designation	
EN	CuSn4
DIN CEN/TS 13388	CW450K
UNS	C51100

Chemical Composition (Balance) Weight percentage		
Cu	Rest	%
Sn	4	%
P	0.1	%

Characteristics

CuSn4 provides an excellent combination of strength, excellent formability and hardness. It has a good electrical conductivity and corrosion resistance. Soldering and brazing properties are excellent.

Main Applications

Stamped parts, Connectors, Contact springs, Spring elements, Ultra high strength spring elements, Membranes, Switch elements, Fixed contacts.

Mechanical Properties (EN 1652)

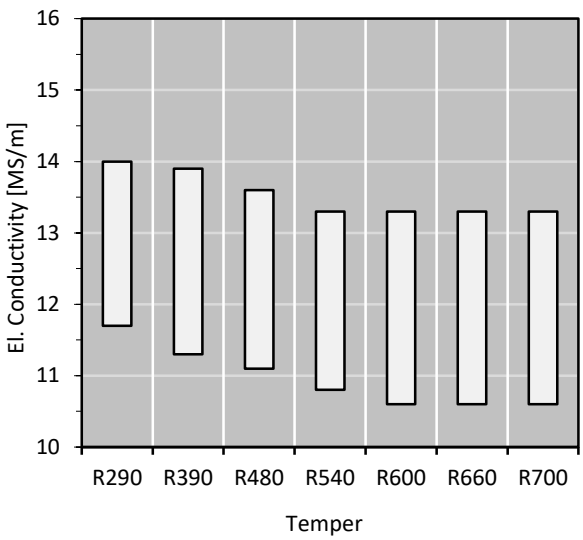
Temper * Only information	**Tensile Strength** **Rm**	**Yield Strength** Standard **$Rp_{0.2}$**	**Yield Strength** Bending optimized **$Rp_{0.2}$**	**Elongation** Bending optimized (min.) **A_{50mm}**	**Hardness *** **HV**	**Bending** optimized quality 90° gw rel. Bending Radius R/T	 bw
	MPa	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R290	290 .. 390	≤ 190 *		40	70 .. 105	0	0
R390	390 .. 490	≥ 320	≥ 250	20	115 .. 155	0	0
R480	480 .. 570	≥ 440	≥ 400	13	150 .. 180	0	0
R540	540 .. 630	≥ 480	≥ 450	12	160 .. 200	0	0
R600	600 .. 760	≥ 560	≥ 530	12	≥ 180	0	0
R660	660 .. 760	≥ 620	≥ 590	7	≥ 180	0	0
R700	700 .. 800	-	≥ 640	3	≥ 190	0	0

Physical Properties

Typical values in annealed temper at 20 °C

Density		8.94	g/cm³
Thermal expansion coefficient	20 .. 300 °C	17.8	10^{-6}/K
Specific heat capacity		0.377	J/(g·K)
Thermal conductivity		100	W/(m·K)
Electrical conductivity	MS/m	12	MS/m
Electrical conductivity	IACS	21	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	0.1	10^{-3}/K
Modulus of elasticity	GPa	110	GPa

Electrical Conductivity



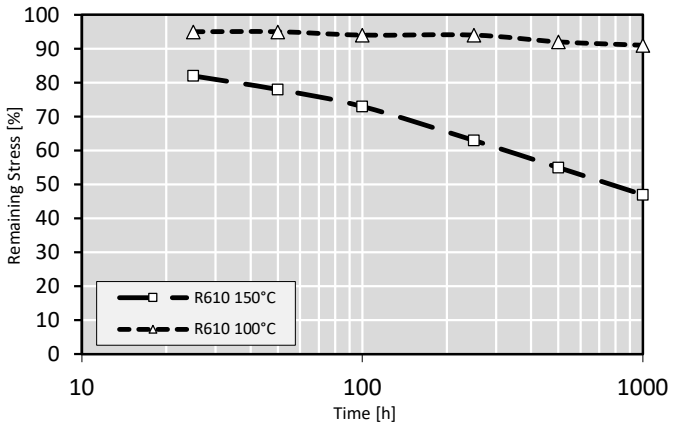
Fabrication Properties *	
Cold Forming Properties	Excellent
Machinability (Rating 20)	Less suitable
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding	Good
Gas Shielded Arc Welding	Good
Laser Welding	Good

*For more details call our technical service

Corrosion Resistance *

CuSn4 has a good resistance to seawater, different agents and industrial atmosphere.

Relaxation Properties



Relaxation values give an indication about stress relieve of strip under tension for a certain time and temperature.
Typical test sample thickness is 0.3 – 0.6 mm.

Initial Stress
80% von $Rp_{0,2}$
Parallel Rolling Direction

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C51000

5.2. CuSn5

Alloy Designation	
EN	CuSn5
DIN CEN/TS 13388	CW451K
UNS	C51000

Characteristics

CuSn5 provides an excellent combination of strength, excellent formability and hardness. It has a good electrical conductivity and corrosion resistance. Soldering and brazing properties are excellent.

Chemical Composition (Balance) Weight percentage		
Cu	Rest	%
Sn	5	%
P	0.1	%

Main Applications

Stamped parts, Connectors, Contact springs, Spring elements, Ultra high strength spring elements, Membranes, Switch elements, Fixed contacts.

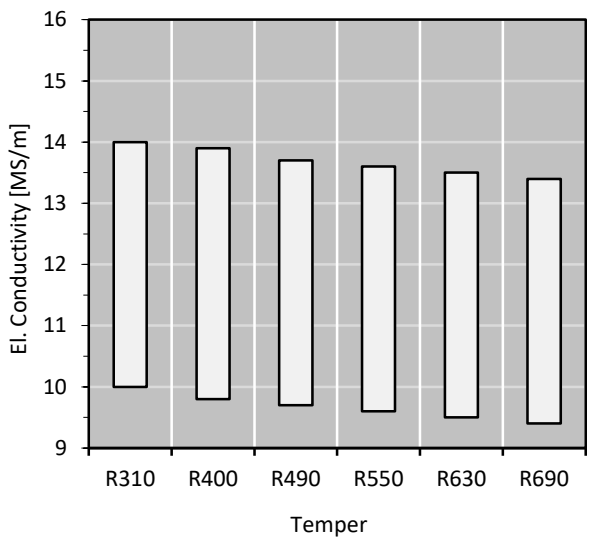
Mechanical Properties (EN 1652)

Temper * only information	**Tensile Strength** **Rm**	**Yield Strength** Standard **$Rp_{0.2}$**	**Yield Strength** Bending optimized **$Rp_{0.2}$**	**Elongation** Bending optimized (min.) **A_{50mm}**	**Hardness *** **HV**	**Bending** optimized quality 90° gw rel. Bending Radius R/T	 bw
	MPa	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R310	310 .. 390	≤ 250 *			70 ..105	0	0
R400	400 .. 500	≥ 340		17	120 .. 160	0	0
R490	490 .. 580	≥ 450	≥ 440	19	160 .. 190	0	0
R550	550 .. 640	≥ 500	≥ 480	13	180 .. 210	0	0.5
R630	630 .. 720	≥ 570	≥ 560	7	200 .. 230	0	1
R690	≥ 690	≥ 630	≥ 600	4	≥ 220	2	3

Physical Properties
Typical values in annealed temper at 20 °C

Density		8.94	g/cm³
Thermal expansion coefficient	20 .. 300 °C	17.8	10^{-6}/K
Specific heat capacity		0.38	J/(g·K)
Thermal conductivity		90	W/(m·K)
Electrical conductivity	MS/m	10	MS/m
Electrical conductivity	IACS	17	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	0.1	10^{-3}/K
Modulus of elasticity	GPa	120	GPa

Electrical Conductivity



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

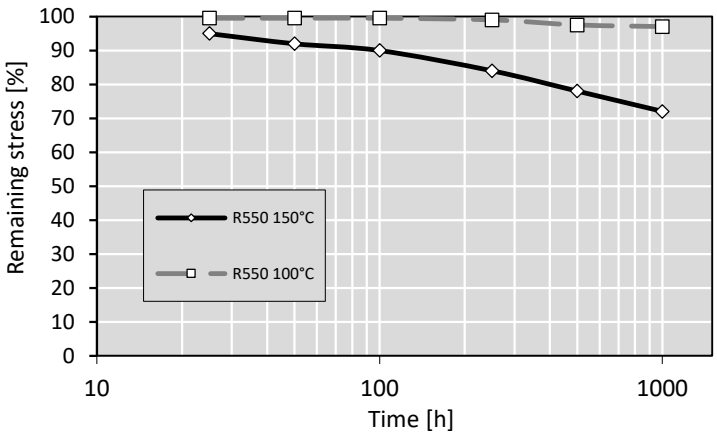
*For more details call our technical service

Corrosion Resistance *

CuSn5 has a good resistance to seawater, different agents and industrial atmosphere.

Largely insensitive to stress corrosion cracking.

Relaxation Properties



Relaxation values give an indication about stress relieve of strip under tension for a certain time and temperature.

Typical test sample thickness is 0.3 – 0.6 mm.

Initial Stress
80% von $Rp_{0,2}$
Parallel Rolling Direction

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C51900

5.3. CuSn6

Alloy Designation	
EN	CuSn6
DIN CEN/TS 13388	CW452K
UNS	C51900

Chemical Composition (Balance) Weight percentage		
Cu	Rest	%
Sn	6	%
P	0.1	%

Characteristics

CuSn6 provides an excellent combination of strength, cold formability and hardness. It is wear resistant, has good corrosion resistance and soldering properties.

Due to its high strength and good spring properties combined with good machining properties it is used for all kind of springs, Connectors, Bourdon tubes or flexible metal tubes.

Main Applications

Stamped parts, Connectors, Contact springs, Spring elements, Ultra high strength spring elements, Membranes, Switch elements, Fixed contacts.

Mechanical Properties (EN 1652)

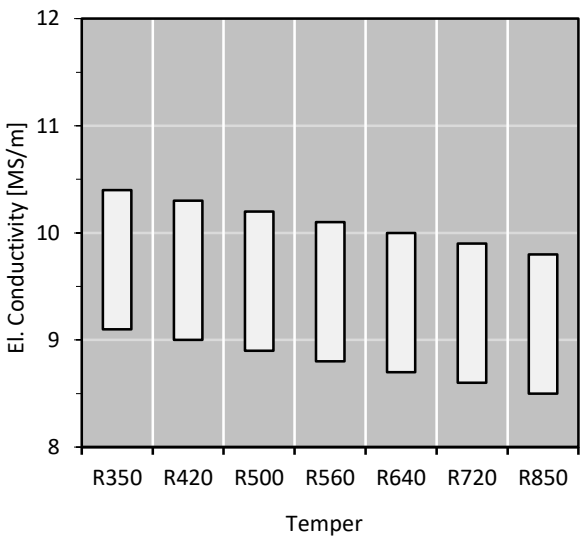
Temper * Only information ** Thickness 0.15 - 0.60 mm	**Tensile Strength** **Rm**	**Yield Strength** Standard **$Rp_{0.2}$**	**Yield Strength** Bending optimized **$Rp_{0.2}$**	**Elongation** Bending optimized min. **A_{50mm}**	**Hardness *** **HV**	**Bendability** 90° gw / bw rel. Bending Radius R/T	
	MPa	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R350	350 .. 420	≤ 300 *		45	80 .. 120	0	0
R420	420 .. 520	≥ 350	≥ 340	29	120 .. 170	0	0
R500	500 .. 590	≥ 450	≥ 410	22	160 .. 190	0	0
R560	560 .. 650	≥ 520	≥ 490	15	180 .. 210	0	0
R640	640 .. 730	≥ 590	≥ 570	12	200 .. 230	0	0.5
R720	≥ 720	≥ 650	≥ 620	4	≥ 210	1	-
**R850 ** **	≥ 850		≥ 800	1.5	≥ 240	1	-

Physical Properties

Typical values in annealed temper at 20 °C

Density		8.95	g/cm³
Thermal expansion coefficient	20 .. 300 °C	18.5	10^{-6}/K
Specific heat capacity		0.377	J/(g·K)
Thermal conductivity		75	W/(m·K)
Electrical conductivity	MS/m	9	MS/m
Electrical conductivity	IACS	16	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	0.7	10^{-3}/K
Modulus of elasticity	GPa	115	GPa

Electrical Conductivity



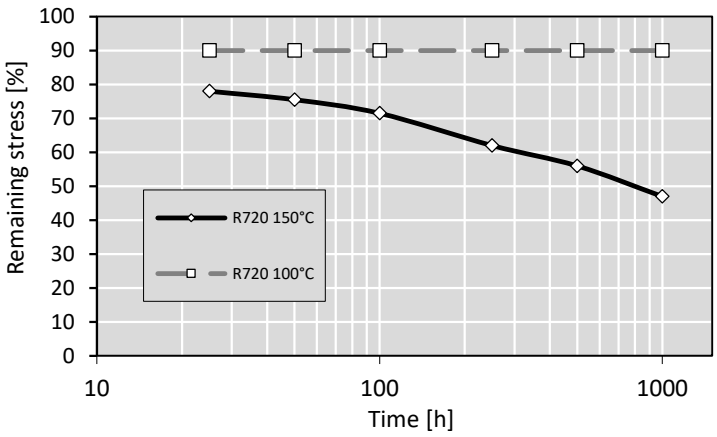
Fabrication Properties *	
Cold Forming Properties	Excellent
Machinability (Rating 20)	Less suitable
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent / Good
Resistance Welding	Good
Gas Shielded Arc Welding	Good
Laser Welding	Good

* For more details call our technical service

Corrosion Resistance *

CuSn6 has a good resistance to seawater, different agents and industrial atmosphere and has a good resistance to tarnishing.

Relaxation Properties



Relaxation values give an indication about stress relieve of strip under tension for a certain time and temperature.
Typical test sample thickness is 0.3 – 0.6 mm.

Initial Stress
80% von $Rp_{0,2}$
Parallel Rolling Direction

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C52100

5.4. CuSn8

Alloy Designation	
EN	CuSn8
DIN CEN/TS 13388	CW453K
UNS	C52100

Chemical Composition (Balance) Weight percentage		
Cu	Rest	%
Sn	8	%
P	0.1	%

Characteristics

CuSn8 strips provide a better corrosion resistance compared to bronze with lower tin-content, combined with higher strength and good slip properties. It is wear resistant, has excellent spring properties, good cold forming and soldering properties.

Main Applications

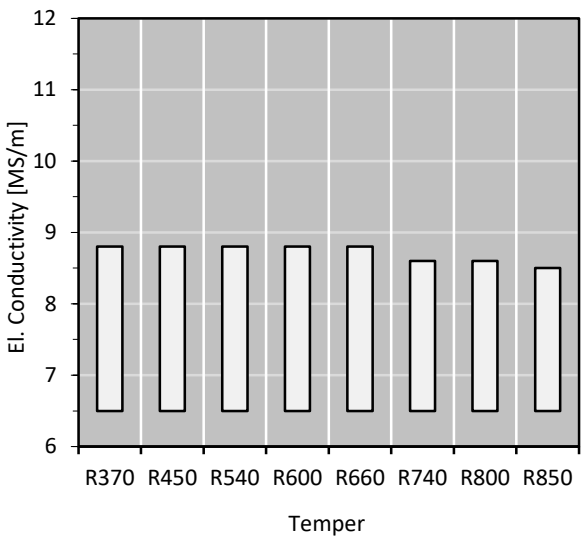
Stamped parts, Connectors, Contact springs, Spring elements, Ultra high strength spring elements, Membranes, Switch elements, Fixed contacts.

Mechanische Eigenschaften (EN 1652)

Temper * Only information ** Thickness 0.15 - 0.60 mm	Tensile Strength Rm	Yield Strength Standard $Rp_{0.2}$	Yield Strength Bending optimized $Rp_{0.2}$	Elongation Bending optimized min. A_{50mm}	Hardness * HV	Bendability 90° gw rel. Bending Radius R/T	bw
	MPa	MPa	MPa	%	HV	Banddicke ≤ 0.50mm	
R370	370 .. 450	≤ 300 *			80 ..120	0	0
R450	450 .. 550	≥ 370	≥ 350	35	120 .. 175	0	0
R540	540 .. 630	≥ 460	≥ 440	27	170 .. 200	0	0
R600	600 .. 690	≥ 520	≥ 480	20	180 .. 210	0	0
R660	660 .. 750	≥ 600	≥ 580	14	210 .. 240	0	2
R740	740 .. 810	≥ 680	≥ 660	8	210 .. 260	2	3
**R800 ** **	800 .. 930	≥ 720	≥ 700	-	230 .. 290	-	-
**R850 ** **	≥ 850	-	≥ 800	-	≥ 240	-	-

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.96	g/cm³
Thermal expansion coefficient	20 .. 300 °C	18.0	10^{-6}/K
Specific heat capacity		0.377	J/(g·K)
Thermal conductivity		67	W/(m·K)
Electrical conductivity	MS/m	6.5	MS/m
Electrical conductivity	IACS	11	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	0.065	10^{-3}/K
Modulus of elasticity	GPa	109	GPa

Electrical Conductivity



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

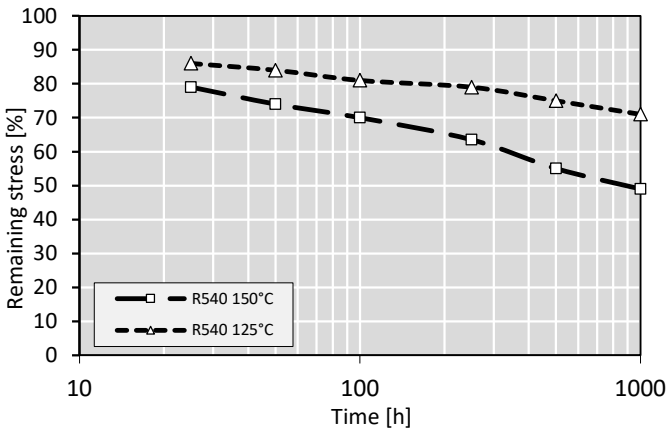
* For more details call our technical service

Corrosion Resistance *

CuSn8 has a good resistance to seawater, different agents and industrial atmosphere and has an excellent resistance to tarnishing.

Largely insensitive to stress corrosion cracking

Relaxation Properties



Relaxation values give an indication about stress relieve of strip under tension for a certain time and temperature.

Typical test sample thickness is 0.3 – 0.6 mm.

Initial Stress
80% von $Rp_{0,2}$
Parallel Rolling Direction

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C70620

6.1. CuNi10Fe1Mn

Alloy Designation	
EN	CuNi10Fe1Mn
DIN CEN/TS 13388	CW352H
UNS	C70620

Characteristics

For many decades, copper-nickel alloy **CuNi10Fe1Mn** 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, **CuNi10Fe1Mn** is resistant to biofouling providing various economic benefit.

Chemical Composition (Balance) Weight percentage		
Cu	Rest	%
Ni	9 … 11	%
Fe	1 … 2	%
Mn	0.5 … 1	%

Main Applications

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

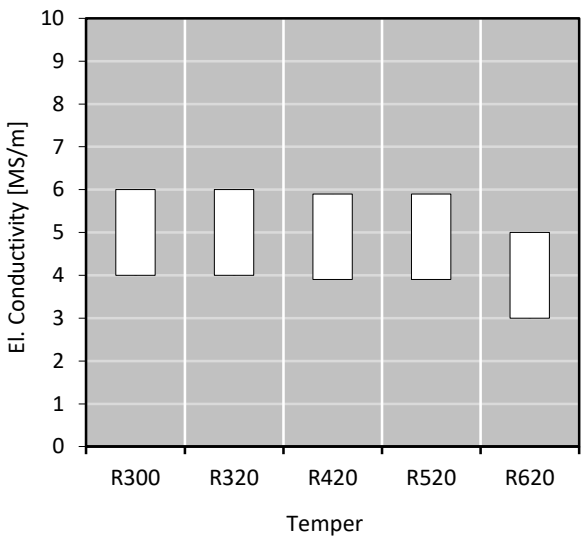
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw	Bending 90° bw
					rel. Bending Radius R/T	
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R300	≥ 300	100 *	20	≥ 70	0	0
R320	≥ 320	180 *	12	≥ 100	0	0
R420	420 .. 510	370 *	3	≥ 120	0	0.5
R520	520 .. 610	480 *	2	≥ 150	1	2
R620	≥ 620	590 *	-	≥ 170	-	-

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.89	g/cm³
Thermal expansion coefficient	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	MS/m	5	MS/m
Electrical conductivity	IACS	9	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	7	10^{-3}/K
Modulus of elasticity	GPa	130	GPa

Electrical Conductivity



Fabrication Properties *	
Cold Forming Properties	Excellent
Machinability (Rating 20)	Good
Electroplating Properties	Good
Hot Tinning Properties	-
Soft Soldering, Brazing	Excellent
Resistance Welding	Excellent
Gas Shielded Arc Welding	Good
Laser Welding	Excellent

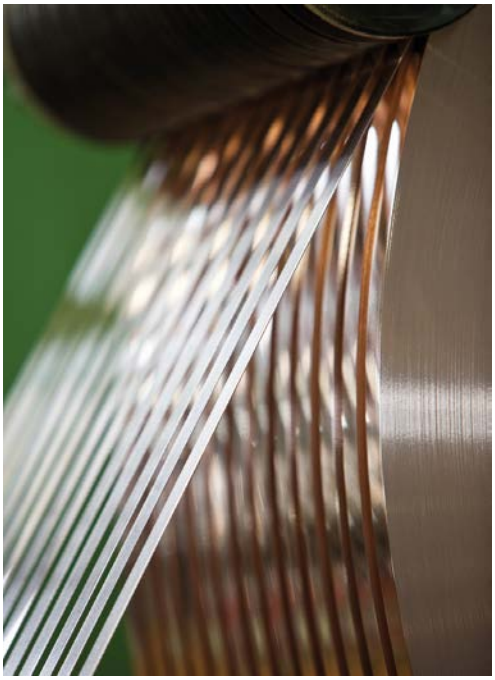
* For more details call our technical service

Corrosion Resistance *

CuNi10Fe1Mn 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.

Practically resistant against stress corrosion cracking.



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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C70250

7.1. CuNi3Si

Alloy Designation	
EN	CuNi3Si
DIN CEN/TS 13388	
UNS	C70250

Characteristics

CuNi3Si is an optimized CuNiSi alloy that can be hardened by cold forming and by precipitation of NiSi-phases during a heat treatment. It has excellent bendability, excellent hot and cold forming properties, a high strength and a good corrosion resistance.

Due to the NiSi-precipitations the relaxation properties, even at temperatures up to 150 °C are excellent. In combination with a tin coating even at temperatures around 150 °C (3.000h) the tin coating does not peel off. The electrical and thermal conductivity is good. Welding, soldering and brazing properties are good too.

Chemical Composition (Balance) Weight percentage		
Cu	Rest	%
Ni	3	%
Si	0.65	%
Mg	0.15	%

Main Applications

Automotive Switches and Relays, Contacts, Connectors, Terminals.
Electrical Switches and Relays, Contacts, Connectors, Terminals, Components for the electrical industry, Stamped parts, Semiconductor Components.

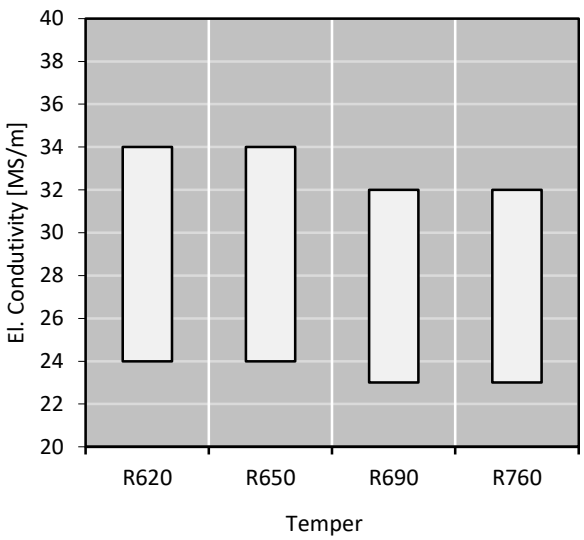
Mechanical Properties (EN 1652)

Temper		Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw	Bending 90° bw
						rel. Bending Radius R/T	
		MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R620	TM00	620 .. 760	500	10	180 .. 240	0	0
R650	TM02	650 .. 825	585	7	190 .. 250	1	1
R690	TM03	690 .. 860	655	5	210 .. 250	1.5	1.5
R760		760 .. 840	720	3	220 .. 260	-	-

Other tempers on request / *only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.87	g/cm³
Thermal expansion coefficient	20 .. 300 °C	17.6	10^{-6}/K
Specific heat capacity		0.399	J/(g·K)
Thermal conductivity		190	W/(m·K)
Electrical conductivity	MS/m	23	MS/m
Electrical conductivity	IACS	40	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	3	10^{-3}/K
Modulus of elasticity	GPa	130	GPa

Electrical Conductivity



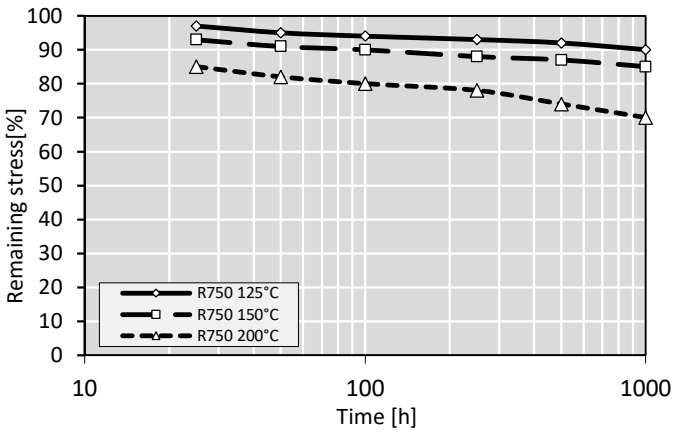
Fabrication Properties *	
Cold Forming Properties	Good
Machinability (Rating 20)	Less suitable
Electroplating Properties	Good
Hot Tinning Properties	Good
Soft Soldering, Brazing	Good
Resistance Welding	Fair
Gas Shielded Arc Welding	Good
Laser Welding	Less suitable

* For more details call our technical service

Corrosion Resistance *

CuNi3Si has good corrosion resistance in natural atmosphere. It is insensitive to stress corrosion cracking.

Relaxation Properties



Relaxation values give an indication about stress relieve of strip under tension for a certain time and temperature.
Typical test sample thickness is 0.3 – 0.6 mm.

Initial Stress
80% von $Rp_{0,2}$
Parallel Rolling Direction

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C42500

7.2. CuSn2Zn10

Alloy Designation	
EN	-
DIN CEN/TS 13388	-
UNS	C42500

Chemical Composition (Balance) Weight percentage		
Cu	87 … 90	%
Sn	1.5 … 3	%
Zn	Rest	%

Characteristics

C42500 has excellent cold forming properties, good conductivity combined with high strength and hardness. Corrosion resistance, especially against seawater and industrial atmosphere is good and stress corrosion cracking susceptibility is low. Spring properties are good, so it is used for applications like spring, connectors, contacts.

Main Applications

Automotive: Switches and Relays, Contacts, Connectors, Terminals.
Electrical: Switches and Relays, Contacts, Connectors, Terminals, Components for the electrical industry, Stamped parts.

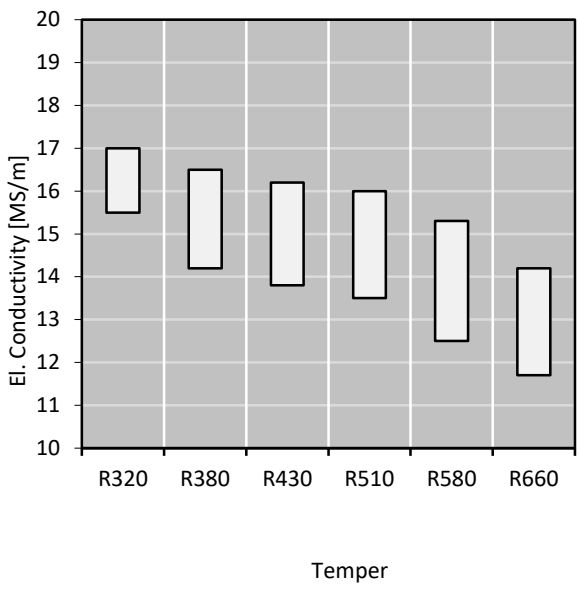
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw	Bending 90° bw
					rel. Bending Radius R/T	
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R320	320 .. 380	≤ 230 *	25	80 .. 110	0	0
R380	380 .. 430	200 *	16	110 .. 140	0	0
R430	430 .. 520	330 *	6	140 .. 170	0	0
R510	510 .. 600	430 *	3	160 .. 190	0	1
R580	580 .. 690	520 *	-	180 .. 210	1	2
R660	≥ 660	610 *	-	≥ 200	-	-

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.81	g/cm³
Thermal expansion coefficient	20 .. 300 °C	18.4	10^{-6}/K
Specific heat capacity		0.38	J/(g·K)
Thermal conductivity		120	W/(m·K)
Electrical conductivity	MS/m	15	MS/m
Electrical conductivity	IACS	25	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	1.0	10^{-3}/K
Modulus of elasticity	GPa	120	GPa

Electrical Conductivity



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

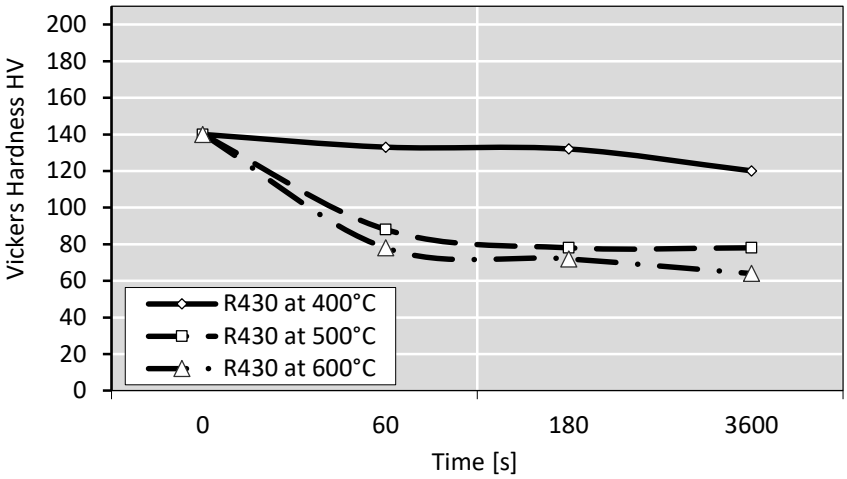
* For more details call our technical service

Corrosion Resistance *

C42500 is resistant to industrial and drinking water, aqueous and alkaline solutions (not oxidizing), pure water vapour (steam), non oxidizing acids (without oxygen in solution) and salts, neutral saline solutions.

Stress corrosion cracking susceptibility is low.

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

CW452K

7.3. CuSn3Zn9

Alloy Designation	
EN	CW454K
DIN CEN/TS 13388	-
UNS	-

Chemical Composition (Balance) Weight percentage		
Cu	Rest	%
Sn	1.5 … 3.5	%
Zn	7.5 … 10	%

Characteristics

CuSn3Zn9 has excellent cold forming properties, good conductivity combined with high strength and hardness. Corrosion resistance, especially against seawater and industrial atmosphere is good and stress corrosion cracking susceptibility is low. Spring properties are good, so it is used for applications like spring, connectors, contacts.

Main Applications

Automotive: Switches and Relays, Contacts, Connectors, Terminals.
Electrical: Switches and Relays, Contacts, Connectors, Terminals, Components for the electrical industry, Stamped parts.

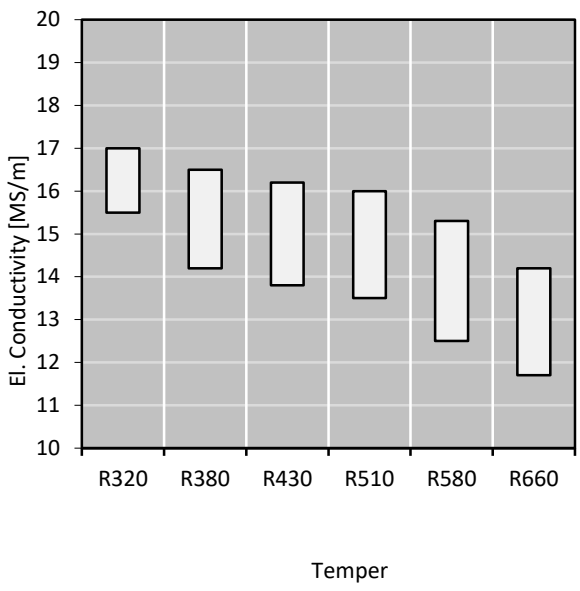
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw	Bending 90° bw
					rel. Bending Radius R/T	
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R320	320 .. 380	≤ 230 *	25	80 .. 110	0	0
R380	380 .. 430	200 *	16	110 .. 140	0	0
R430	430 .. 520	330 *	6	140 .. 170	0	0
R510	510 .. 600	430 *	3	160 .. 190	0	1
R580	580 .. 690	520 *	-	180 .. 210	1	2
R660	≥ 660	610 *	-	≥ 200	-	-

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.81	g/cm³
Thermal expansion coefficient	20 .. 300 °C	18.4	10^{-6}/K
Specific heat capacity		0.38	J/(g·K)
Thermal conductivity		120	W/(m·K)
Electrical conductivity	MS/m	15	MS/m
Electrical conductivity	IACS	25	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	1.0	10^{-3}/K
Modulus of elasticity	GPa	120	GPa

Electrical Conductivity



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

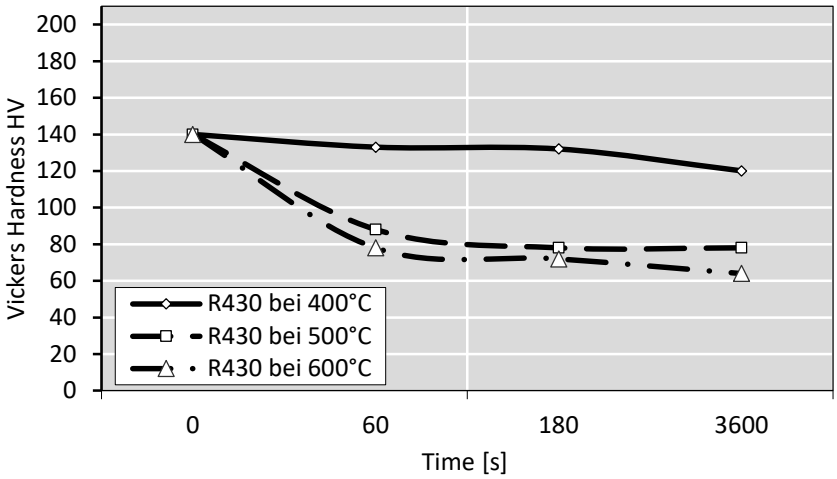
* For more details call our technical service

Corrosion Resistance *

CuSn3Zn9 is resistant to industrial and drinking water, aqueous and alkaline solutions (not oxidizing), pure water vapour (steam), non oxidizing acids (without oxygen in solution) and salts, neutral saline solutions.

Stress corrosion cracking susceptibility is low.

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C15500

7.4. CuMgAgP

Alloy Designation	
EN	
DIN CEN/TS 13388	
UNS	C15500

Characteristics

C15500 is alloyed with Magnesium (Mg) to achieve a high strength combined with very good conductivity. It has good relaxation properties, high softening resistance and oxidation stability.

Chemical Composition (Balance) Weight percentage		
Cu (incl. Ag)	≥ 99.75	%
Mg	0.1	%
P	0.06	%
Ag	0.06	%

Main Applications

Electrical contacts, Connectors and Electronic Components.

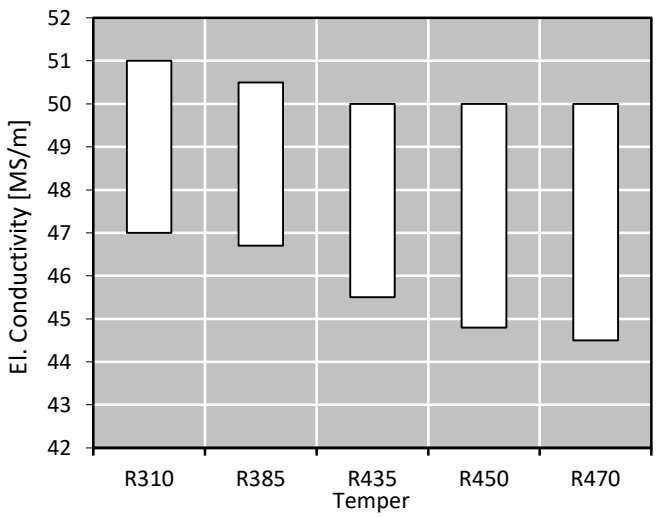
Mechanical Properties (EN 1652)

Temper		Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw	Bending 90° bw
		MPa	MPa	%	HV	rel. Bending Radius R/T Strip Thickness ≤ 0.50mm	
R235	O61 (soft)	235 .. 295	105	30	-	0	0
R310	H02 (½ hard)	310 .. 380	260	13	90 .. 130	0	0
R385	H04 (hard)	385 .. 440	345	6	125 .. 145	0	0.5
R435	H06 (extra hard)	435 .. 495	385	5	140 .. 160	0.5	1
R450	H08 (spring)	450 .. 505	415	4	≥ 135	0.5	1
R470	H10 (extra spring)	470 .. 515	435	3	-	1	2

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.91	g/cm³
Thermal expansion coefficient	20 .. 300 °C	17.8	10^{-6}/K
Specific heat capacity		0,385	J/(g·K)
Thermal conductivity		350	W/(m·K)
Electrical conductivity	MS/m	50	MS/m
Electrical conductivity	IACS	86	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	2.5	10^{-3}/K
Modulus of elasticity	GPa	120	GPa

Electrical Conductivity

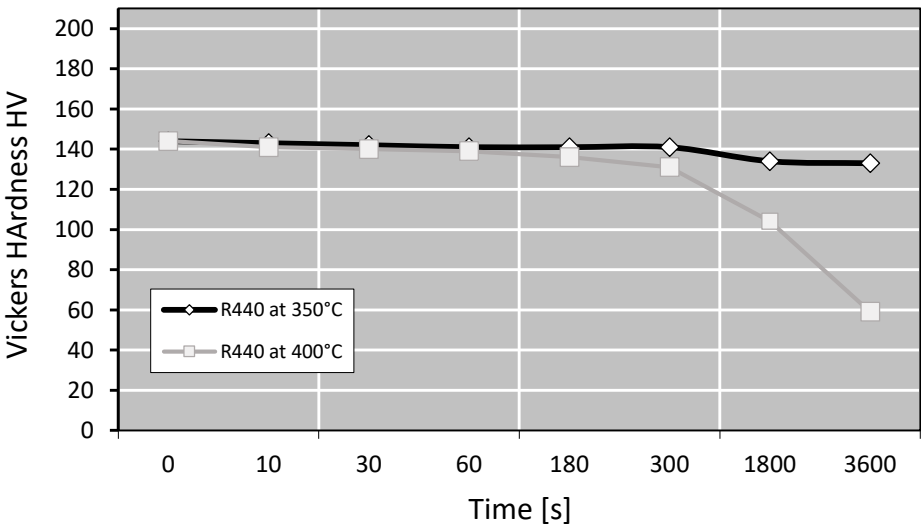


Fabrication Properties *	
Cold Forming Properties	Excellent
Machinability (Rating 20)	Less suitable
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding	Less suitable
Gas Shielded Arc Welding	Excellent
Laser Welding	Fair

* For more details call our technical service

Corrosion Resistance *
Practically resistant against stress corrosion cracking

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C18070

8.1. STOL® 75 - CuCrSiTi

Alloy Designation	STOL® 75
EN	CuCrSiTi
DIN CEN/TS 13388	
UNS	C18070

Chemical Composition (Balance) Weight percentage		
Cu	Rest	%
Cr	0.3	%
Si	0.02	%
Ti	0.1	%

Characteristics

STOL® 75 is a CuCrSiTi alloy that can be hardened by cold forming and by precipitation during a heat treatment. This alloy provides a good combination of high electrical conductivity, good strength, good bendability, excellent hot and cold forming properties and a good corrosion resistance.

Due to the Precipitations the relaxation properties, even at temperatures up to 200 °C are excellent.

Main Applications

E-Mobility, Hybrid Applications, Elecrical contacts, Automotive Connectors, Photovoltaic-Systems and Electronic Components.

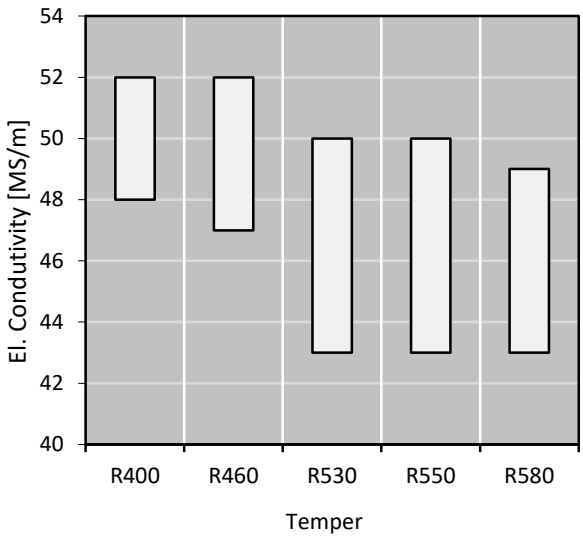
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw rel. Bending Radius R/T	Bending 90° bw rel. Bending Radius R/T
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R400	400 .. 480	300	10	120 .. 150	0	0
R460	460 .. 560	400	9	140 .. 170	0.5	0.5
R530	530 .. 610	460	8	150 .. 190	1	1
R550	550 .. 630	520	7	150 .. 190	1	1
R580	580 .. 640	550	6	160 .. 200	1,5	1,5

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.93	g/cm³
Thermal expansion coefficient	20 .. 300 °C	18.0	10^{-6}/K
Specific heat capacity		0.38	J/(g·K)
Thermal conductivity		310	W/(m·K)
Electrical conductivity	MS/m	48	MS/m
Electrical conductivity	IACS	83	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	3	10^{-3}/K
Modulus of elasticity	GPa	135	GPa

Electrical Conductivity



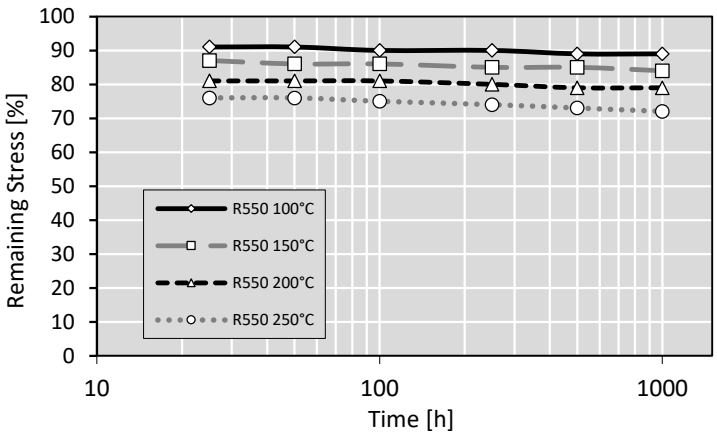
Fabrication Properties *	
Cold Forming Properties	Good
Machinability (Rating 20)	Less suitable
Electroplating Properties	Good
Hot Tinning Properties	Good
Soft Soldering, Brazing	Good
Resistance Welding	Less suitable
Gas Shielded Arc Welding	Excellent
Laser Welding	Fair

* For more details call our technical service

Corrosion Resistance *

STOL® 75 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.

Relaxation Properties



Relaxation values give an indication about stress relieve of strip under tension for a certain time and temperature.
Typical test sample thickness is 0.3 – 0.6 mm.

Initial Stress
80% von $Rp_{0,2}$
Parallel Rolling Direction

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C19010

8.2. STOL® 76 - CuNiSi

Alloy Designation	STOL® 76
EN	CuNiSi
DIN CEN/TS 13388	
UNS	C19010

Characteristics

STOL® 76 is a CuNiSi alloy that can be hardened by cold forming and by precipitation of NiSi-phases during a heat treatment. It has excellent bendability, excellent hot and cold forming properties, a high strength and a good corrosion resistance.

Due to the NiSi-precipitations the relaxation properties, even at temperatures up to 150 °C are excellent. The electrical and thermal conductivity is good. Welding, soldering and brazing properties are good too.

Chemical Composition (Balance)

Weight percentage

Cu	Rest	%
Ni	1.3	%
Si	0.25	%
P	0.03	%

Main Applications

Automotive: Switches and Relays, Contacts, Connectors, Terminals.
Electrical: Switches and Relays, Contacts, Connectors, Terminals, Components for the electrical industry, Stamped parts, Semiconductor Components, Junction Boxes.

Mechanical Properties (EN 1652)

Temper	Temper H.. = Cold worked TM = Mill hardened	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}		Hardness HV **	Bending 90° gw rel. Bending Radius R/T	 bw
		MPa	MPa	%		HV	Strip Thickness ≤ 0.50mm	
R360	H01 (¼ hard)	360 .. 430	300	12	14 *	100 .. 130	0	0
R410	H02 (½ hard)	410 .. 470	360	9	11 *	125 .. 155	0	0
R460	H04 (¾ hard)	460 .. 520	410	7	9 *	135 .. 165	0.5	1
R520	H06 (extra hard)	520 .. 580	460	5	7 *	145 .. 175	1	2
R520	TM06 (XHM)	520 .. 590	440	8		155 .. 180	0.5	0.5
R580	TM08 (SHM)	580 .. 650	520	9		160 .. 210	1	1

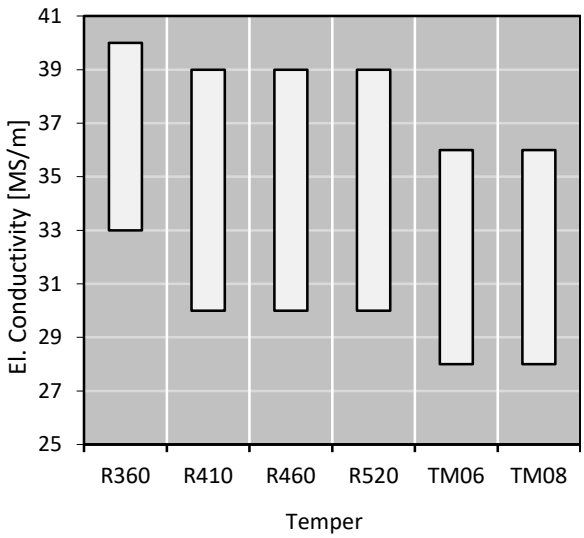
* values for stress relieved qualities / ** only for information

Physical Properties

Typical values in annealed temper at 20 °C

Density		8.93	g/cm³
Thermal expansion coefficient	20 .. 300 °C	16.8	10^{-6}/K
Specific heat capacity		0.377	J/(g·K)
Thermal conductivity		260	W/(m·K)
Electrical conductivity	MS/m	35	MS/m
Electrical conductivity	IACS	60	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	2	10^{-3}/K
Modulus of elasticity	GPa	135	GPa

Electrical Conductivity



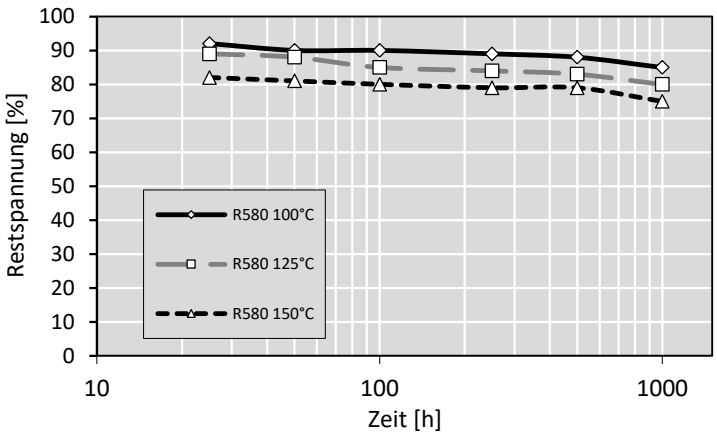
Fabrication Properties *	
Cold Forming Properties	Excellent
Machinability (Rating 20)	Less suitable
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding	Less suitable
Gas Shielded Arc Welding	Excellent
Laser Welding	Fair

* For more details call our technical service

Corrosion Resistance *

STOL® 76 has good corrosion resistance.
The alloy is insensitive to stress corrosion cracking.

Relaxation Properties



Relaxation values give an indication about stress relieve of strip under tension for a certain time and temperature.
Typical test sample thickness is 0.3 – 0.6 mm.

Initial Stress
80% von $Rp_{0,2}$
Parallel Rolling Direction

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C19005

8.3. STOL® 76M - CuNiSi

Alloy Designation	STOL® 76M
EN	CuNiSi
DIN CEN/TS 13388	
UNS	C19005

Chemical Composition (Balance)
Weight percentage

Cu	Rest	%
Ni	1.5	%
Si	0.3	%
Sn	0.1	%
Zn	0.4	%

Characteristics

STOL® 76M is an optimized CuNiSi alloy that can be hardened by cold forming and by precipitation of NiSi-phases during a heat treatment. It has excellent bendability, excellent hot and cold forming properties, a high strength and a good corrosion resistance.

Due to the NiSi-precipitations the relaxation properties, even at temperatures up to 150 °C are excellent. In combination with a tin coating even at temperatures around 150 °C (3.000h) the tin coating does not peel off. The electrical and thermal conductivity is good. Welding, soldering and brazing properties are good too.

Main Applications

Automotive: Switches and Relays, Contacts, Connectors, Terminals , Press fits.
Electrical: Switches and Relays, Contacts, Connectors, Terminals, Press fits, Components for the electrical industry, Stamped parts, Semiconductor Components.

Mechanical Properties (EN 1652)

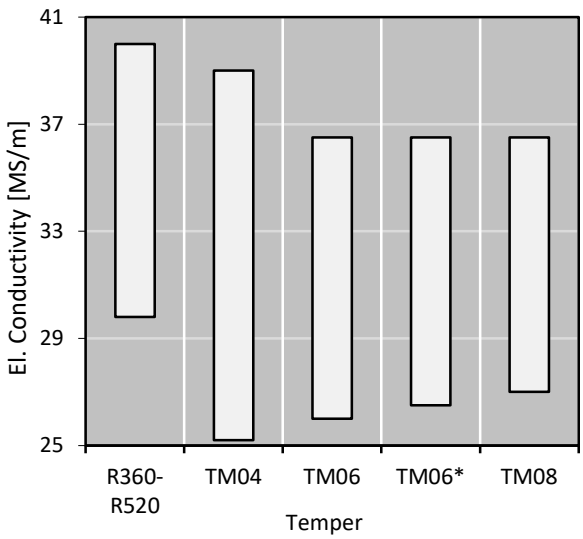
* values for stress relieved qualities

Temper	Temper H.. = Cold worked TM = Mill hardened	Tensile Strength Rm MPa	Yield Strength min. $Rp_{0.2}$ Mpa	Elongation min. A_{50mm} %	Hardness HV only for information	Bendability 90° gw / bw rel. Bending Radius R/T Strip Thickness ≤ 0.50mm
R360	H01 (¼ hard)	360 .. 430	300	12 14 *	100 .. 130	0 / 0
R410	H02 (½ hard)	410 .. 470	360	9 11 *	125 .. 155	0 / 0
R460	H03 (¾ hard)	460 .. 520	410	7 9 *	135 .. 165	0.5 / 1
R520	H06 (extra hard)	520 .. 580	460	5 7 *	145 .. 175	1 / 2
R530	TM04 (HM)	530 .. 630	430	14	150 .. 190	0 / 0
R580	TM06 (XHM)	580 .. 650	540	8	170 .. 200	1 / 1
R580S	TM06 (XHM) bending optimized	580 .. 650	520	9	170 .. 200	0.5 / 0.5
R620	TM08 (SHM)	620 .. 700	560	7	180 .. 210	1 / 1.5

Physical Properties
Typical values in annealed temper at 20 °C

Density		8.92	g/cm³
Thermal expansion coefficient	20 .. 300 °C	16.8	10^{-6}/K
Specific heat capacity		0.377	J/(g·K)
Thermal conductivity		250	W/(m·K)
Electrical conductivity	MS/m	33	MS/m
Electrical conductivity	IACS	57	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	2	10^{-3}/K
Modulus of elasticity	GPa	135	GPa

Electrical Conductivity



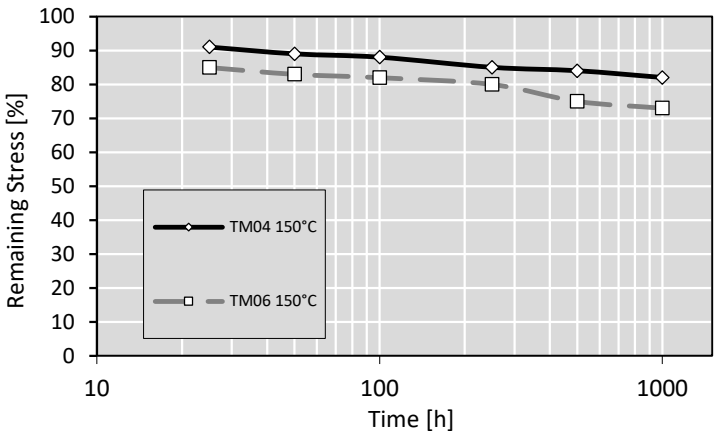
Fabrication Properties *	
Cold Forming Properties	Excellent
Machinability (Rating 20)	Less suitable
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding	Less suitable
Gas Shielded Arc Welding	Excellent
Laser Welding	Fair

* For more details call our technical service

Corrosion Resistance *

STOL® 76M has good corrosion resistance.
The alloy is insensitive to stress corrosion cracking.

Relaxation Properties



Relaxation values give an indication about stress relieve of strip under tension for a certain time and temperature.
Typical test sample thickness is 0.3 – 0.6 mm.

Initial Stress
80% von $Rp_{0,2}$
Parallel Rolling Direction

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C18665

8.4. STOL® 78 - CuMgP

Alloy Designation	STOL® 78
EN	CuMgP
DIN CEN/TS 13388	
UNS	C18665

Chemical Composition (Balance)
Weight percentage

Cu	Rest	%
Mg	0.6	%
P	0.01	%

Characteristics

STOL® 78 is a high Magnesium (Mg) alloyed material with excellent formability at medium strength and good conductivity. Typical applications are automotive, electrical and electronic connectors, relays, current carrying springs and junction boxes.

Main Applications

Automotive: Switches and Relays, Contacts, Connectors, Terminals.

Electrical: Switches and Relays, Contacts, Connectors, Terminals, Components for the electrical industry, Stamped parts, Semiconductor Components.

Mechanical Properties (EN 1652)

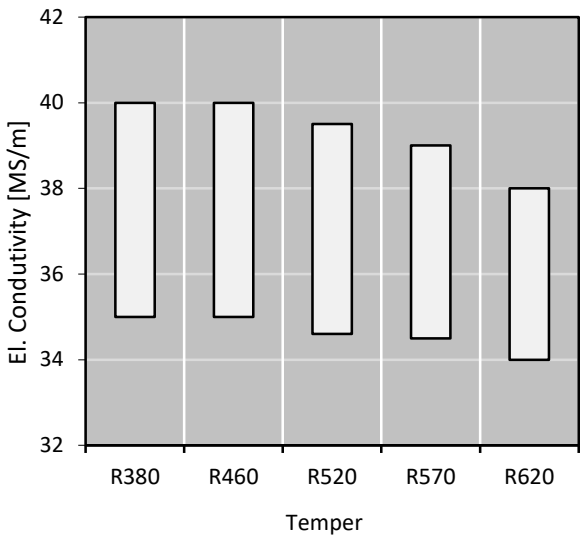
Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw	Bending 90° bw
					rel. Bending Radius R/T	
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R380	380 .. 460	330	14	115 .. 145	0	0
R460	460 .. 520	410	10	140 .. 165	0.5	1
R520	520 .. 570	460	8	160 .. 180	1	2.5
R570	570 .. 620	500	6	175 .. 195	2.5	5
R620 **	≥ 620	550	3	≥ 190	3	6

*only for information / ** Thickness max. 0.50 mm

Physical Properties
Typical values in annealed temper at 20 °C

Density		8.81	g/cm³
Thermal expansion coefficient	20 .. 300 °C	17.3	10^{-6}/K
Specific heat capacity		0.32	J/(g·K)
Thermal conductivity		270	W/(m·K)
Electrical conductivity	MS/m	36	MS/m
Electrical conductivity	IACS	62	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	2.5	10^{-3}/K
Modulus of elasticity	GPa	130	GPa

Electrical Conductivity



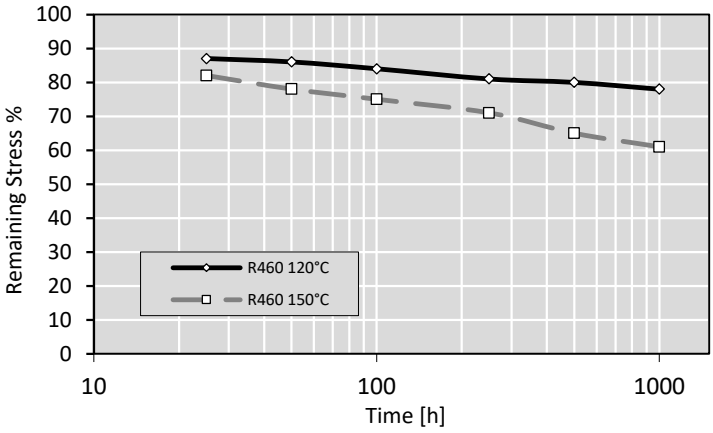
Fabrication Properties *	
Cold Forming Properties	Excellent
Machinability (Rating 20)	Less suitable
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding	Less suitable
Gas Shielded Arc Welding	Excellent
Laser Welding	Fair

* For more details call our technical service

Corrosion Resistance *

STOL® 78 has a good resistance in in natural and industrial atmosphere.
Practically resistant against stress corrosion cracking.

Relaxation Properties



Relaxation values give an indication about stress relieve of strip under tension for a certain time and temperature.
Typical test sample thickness is 0.3 – 0.6 mm.

Initial Stress
80% von $Rp_{0,2}$
Parallel Rolling Direction

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C14410

8.5. STOL® 80 - CuSn0.20

Alloy Designation	STOL® 80
EN	CuSn0,2
DIN CEN/TS 13388	
UNS	C14410

Characteristics

STOL® 80 is a low Tin (Sn) special alloy that combines low cost with highest conductivity. The total cost for finish products are often equal to brass due to excellent conditions for stamping scrap.

Typical applications are male connectors and fuse boxes.

Chemical Composition (Balance) Weight percentage		
Cu	Rest	%
Sn	0.2	%
P	0.01	%

Main Applications

Automotive: Switches and Relays, Contacts, Connectors, Terminals.

Electrical: Switches and Relays, Contacts, Connectors, Terminals, Components for the electrical industry, Stamped parts, Semiconductor Components.

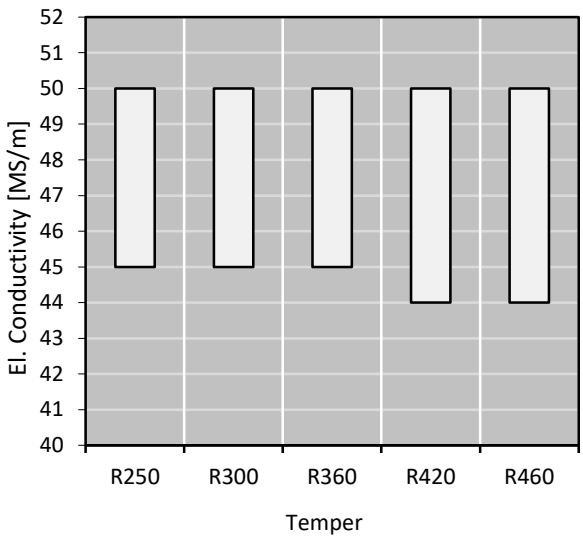
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw rel. Bending Radius R/T	Bending 90° bw rel. Bending Radius R/T
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R250	≥ 250	≤ 140	20	60 .. 80	0	0
R300	300 .. 370	270	10	80 .. 100	0	0
R360	360 .. 430	310	7	110 .. 130	0	0
R420	420 .. 490	370	5	120 .. 150	1	1
R460	≥ 460	410	4	≥ 135	1	1.5

*only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.94	g/cm³
Thermal expansion coefficient	20 .. 300 °C	17.3	10^{-6}/K
Specific heat capacity		0.385	J/(g·K)
Thermal conductivity		330	W/(m·K)
Electrical conductivity	MS/m	44	MS/m
Electrical conductivity	IACS	76	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	3.3	10^{-3}/K
Modulus of elasticity	GPa	120	GPa

Electrical Conductivity

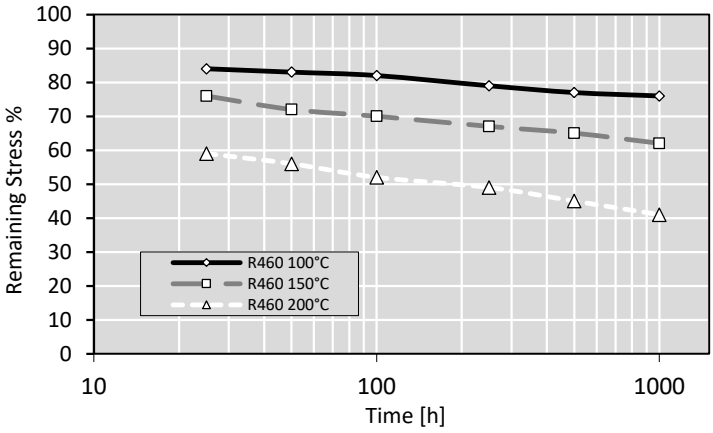


Fabrication Properties *	
Cold Forming Properties	Excellent
Machinability (Rating 20)	Fair
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding	Fair
Gas Shielded Arc Welding	Excellent
Laser Welding	Good

* For more details call our technical service

Corrosion Resistance *
Practically resistant against stress corrosion cracking

Relaxation Properties



Relaxation values give an indication about stress relieve of strip under tension for a certain time and temperature.
Typical test sample thickness is 0.3 – 0.6 mm.

Initial Stress
80% von $Rp_{0,2}$
Parallel Rolling Direction

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C14415

8.6. STOL® 81 - CuSn0.15

Alloy Designation	STOL® 81
EN	
DIN CEN/TS 13388	CW117C
UNS	C14415 #

geringer Unterschied in der chemischen Zusammensetzung

Characteristics

CuSn0,15 is a low Tin (Sn) special alloy that combines low cost with highest conductivity. The total cost for finish products are often equal to brass due to excellent conditions for stamping scrap.

Typical applications are male connectors and fuse boxes.

Chemical Composition (Balance) Weight percentage		
Cu	Rest	%
Sn	0.1	%

Main Applications

Automotive: Switches and Relays, Contacts, Connectors, Terminals.
Elektrotechnik: Switches and Relays, Contacts, Connectors, Terminals, Components for the electrical industry, Stamped parts, Semiconductor Components.

Mechanical Properties (EN 1652)

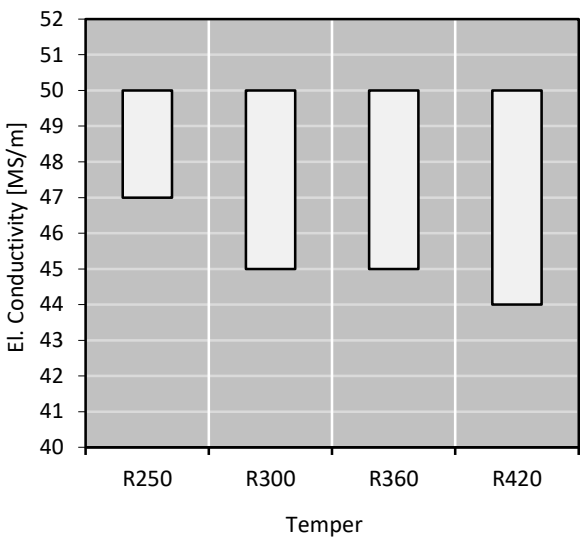
Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw rel. Bending Radius R/T	Bending 90° bw rel. Bending Radius R/T
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R250	250 .. 320	200	9	60 .. 90	0	0
R300	300 .. 370	250	4	85 .. 110	0	0
R360	360 .. 430	300	3	105 .. 130	0	0
R420	420 .. 490	350	2	120 .. 140	1	1

* only for information

Physical Properties
Typical values in annealed temper at 20 °C

Density		8.93	g/cm³
Thermal expansion coefficient	20 .. 300 °C	18	10^{-6}/K
Specific heat capacity		0.385	J/(g·K)
Thermal conductivity		340	W/(m·K)
Electrical conductivity	MS/m	47	MS/m
Electrical conductivity	IACS	81	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	3.3	10^{-3}/K
Modulus of elasticity	GPa	120	GPa

Electrical Conductivity

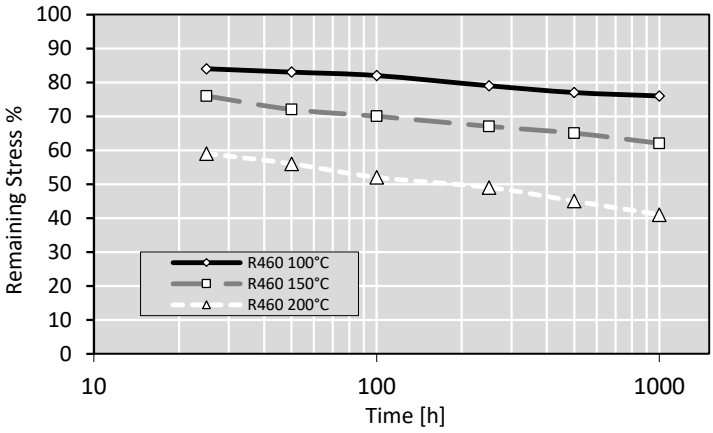


Fabrication Properties *	
Cold Forming Properties	Excellent
Machinability (Rating 20)	Fair
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding	Fair
Gas Shielded Arc Welding	Excellent
Laser Welding	Good

* For more details call our technical service

Corrosion Resistance *
Practically resistant against stress corrosion cracking

Relaxation Properties



Relaxation values give an indication about stress relieve of strip under tension for a certain time and temperature.
Typical test sample thickness is 0.3 – 0.6 mm.

Initial Stress
80% von $Rp_{0,2}$
Parallel Rolling Direction

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C70315

8.7. STOL® 94 - CuNiSi

Alloy Designation	STOL® 94
EN	CuNiSi
DIN CEN/TS 13388	
UNS	C70315

Chemical Composition (Balance)

Weight percentage

Cu	Rest	%
Ni	2.5	%
Si	0.6	%
Zn	≤ 2	%
Sn	≤ 1	%

Characteristics

STOL® 94 is a CuNiSi alloy which is available in cold worked and precipitation hardened tempers. It combines maximum strength with excellent bendability, good electrical conductivity, excellent resistance against relaxation.
Partial substitute for copper-beryllium alloys.
Due to the NiSi-precipitations the relaxation properties, even at temperatures up to 150 °C are excellent. In combination with a tin coating even at temperatures around 150 °C (3.000h) the tin coating does not peel off. The electrical and thermal conductivity is good. Welding, soldering and brazing properties are good too.

Main Applications

Automotive: Switches and Relays, Terminals, Contacts, Connectors, miniaturized connectors.
Electrical: Switches and Relays, Terminals, Contacts, Connectors.

Mechanical Properties (EN 1652)

* values for stress relieved qualities

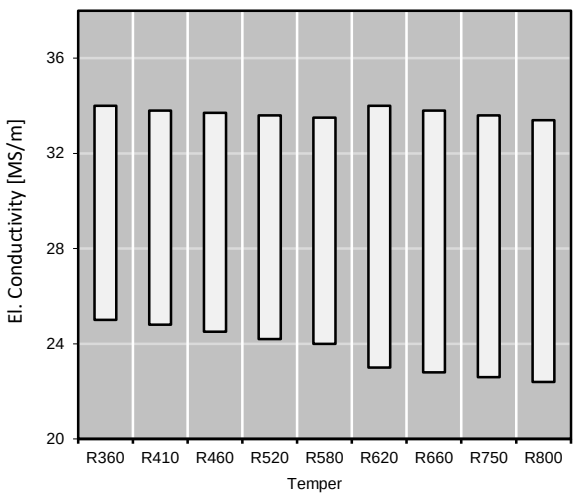
Temper	Temper H.. = Cold worked TM = Mill hardened	Tensile Strength Rm MPa	Yield Strength min. $Rp_{0.2}$ Mpa	Elongation min. A_{50mm} %	Hardness HV only for information	Bendability 90° gw rel. Bending Radius R/T Strip Thickness ≤ 0.50mm	Bendability 90° bw rel. Bending Radius R/T Strip Thickness ≤ 0.50mm
R360	H00 ($^1/_8$ Hard)	360 .. 430	250	14 16 *	100 .. 130	0	0
R410	H01 ($^1/_4$ Hard)	410 .. 470	360	9 12 *	125 .. 155	0	0.5
R460	H02 ($^1/_2$ Hard)	460 .. 520	410	7 10 *	135 .. 165	0.5	1
R520	H03 ($^3/_4$ Hard)	520 .. 580	460	5 8 *	145 .. 175	1	2
R580	H06 (Extra Hard)	580 .. 650	520	4 6 *	170 .. 200	1	2.5
R620	TM01 ($^1/_2$ Hard)	620 .. 720	540	16	180 .. 240	0	0
R660	TM02 ($^1/_2$ Hard)	660 .. 750	590	10	200 . 250	1	1
R750	TM04 (Hard)	750 .. 830	680	8	210 .. 260	2	2
R800	TM05 (SHM)	≥ 800	750	5	≥ 210	2	3

Physical Properties

Typical values in annealed temper at 20 °C

Density		8.86	g/cm³
Thermal expansion coefficient	20 .. 300 °C	17	10^{-6}/K
Specific heat capacity		0.399	J/(g·K)
Thermal conductivity		185	W/(m·K)
Electrical conductivity	MS/m	25	MS/m
Electrical conductivity	IACS	43	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	3	10^{-3}/K
Modulus of elasticity	GPa	130	GPa

Electrical Conductivity



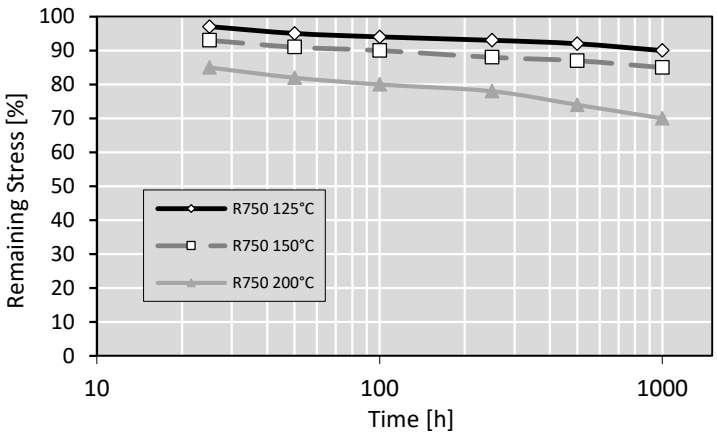
Fabrication Properties *	
Cold Forming Properties	Good
Machinability (Rating 20)	Less suitable
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding	Fair
Gas Shielded Arc Welding	Good
Laser Welding	Less suitable

* For more details call our technical service

Corrosion Resistance *

STOL® 94 has a good resistance in in natural and industrial atmosphere.
Practically resistant against stress corrosion cracking.

Relaxation Properties



Relaxation values give an indication about stress relieve of strip under tension for a certain time and temperature.
Typical test sample thickness is 0.3 – 0.6 mm.

Initial Stress
80% von $Rp_{0,2}$
Parallel Rolling Direction

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.

Available delivery forms *
Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C18160

8.8. STOL® 95 - CuCrZr

Alloy Designation	STOL® 95
EN	CuCr1Zr
DIN CEN/TS 13388	
UNS	C18160

Characteristics

STOL® 95 is a CuCrZr alloy that can be hardened by cold forming and by precipitation of CuCrZr - 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 CrZr-precipitations the relaxation properties, even at temperatures up to 250 °C are excellent. The electrical and thermal conductivity is excellent. Welding, soldering and brazing properties are good too.

Chemical Composition (Balance)

Weight percentage

Cu (incl. Ag)	Rest	%
Cr	0.8	%
Zr	0.2	%

Main Applications

Automotive: Switches and Relays, Contacts, Connectors, Terminals, Press fits, Hybrid Cars.

Electrical: Switches and Relays, Contacts, Connectors, Terminals, Press fits, Components for the electrical industry, Stamped parts, Semiconductor Components, Junction Boxes, Photovoltaic Systems.

Mechanical Properties (EN 1652)

Temper	Temper TM = Mill hardened	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw rel. Bending Radius R/T	Bending 90° bw rel. Bending Radius R/T
		MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R480	TM04	480 .. 560	450	8	150 .. 190	1.5	1.5
R540	TM08	540 .. 630	500	4	160 .. 200	2	2
R540S	TR08	540 .. 620	480	8	160 .. 190	1.5	1.5

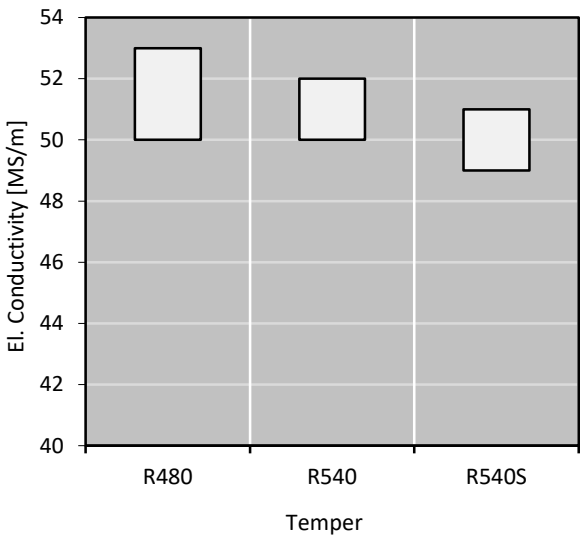
* only for information

Physical Properties

Typical values in annealed temper at 20 °C

Density		8.92	g/cm³
Thermal expansion coefficient	20 .. 300 °C	18.0	10^{-6}/K
Specific heat capacity		0.381	J/(g·K)
Thermal conductivity		330	W/(m·K)
Electrical conductivity	MS/m	50	MS/m
Electrical conductivity	IACS	86	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	3	10^{-3}/K
Modulus of elasticity	GPa	135	GPa

Electrical Conductivity



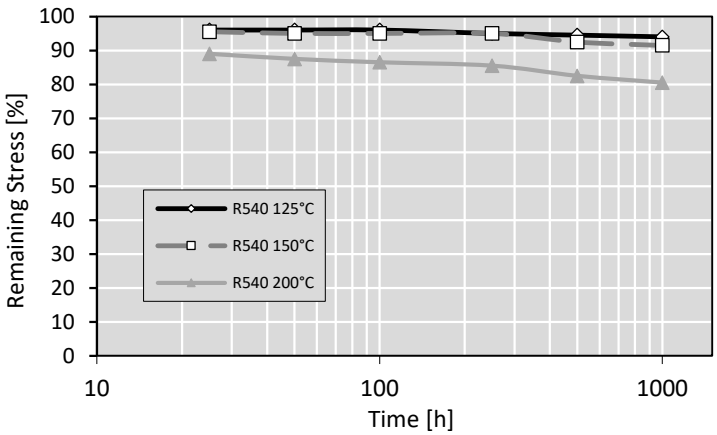
Fabrication Properties *	
Cold Forming Properties	Good
Machinability (Rating 20)	Less suitable
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding	Less suitable
Gas Shielded Arc Welding	Excellent
Laser Welding	Fair

* For more details call our technical service

Corrosion Resistance *

STOL® 95 is resistant to pure water vapour and non oxidizing acids and alkalis as well as neutral saline solutions.
The alloy is insensitive to stress corrosion cracking.

Relaxation Properties



Relaxation values give an indication about stress relieve of strip under tension for a certain time and temperature.
Typical test sample thickness is 0.3 – 0.6 mm.

Initial Stress
80% von $Rp_{0,2}$
Parallel Rolling Direction

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.

Available delivery forms *

Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

C19400

8.9. STOL® 194 - CuFe2P

Alloy Designation	STOL® 194
EN	CuFe2P
DIN CEN/TS 13388	CW107C
UNS	C19400

Characteristics

STOL®194 is a medium strength alloy, with fine Fe precipitations. It combines high conductivity with medium strength and good relaxation properties.

Chemical Composition (Balance) Weight percentage		
Cu	Rest	%
Fe	2.4	%
Zn	0.1	%
P	0.03	

Main Applications

Automotive: Fuel Injectors, Electrical Connectors – Automotive.

Electrical: Circuit Breaker, Components, Contact Springs, Lead Frames, Electrical Connectors, Cable Warp, Electrical

Springs: Clamps, Plug Contacts, Fuse Clips, Terminal.

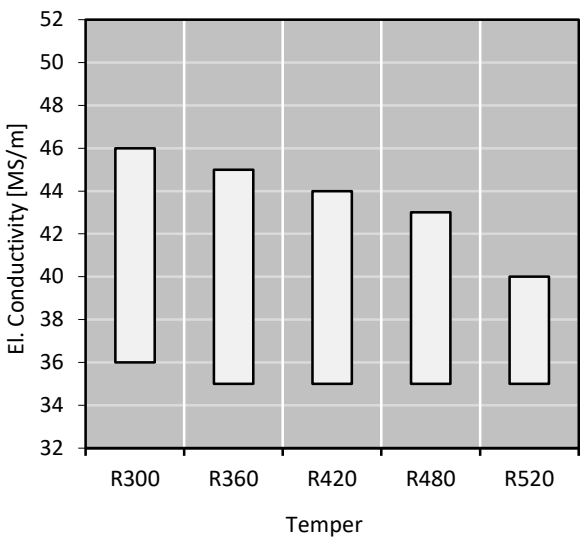
Mechanical Properties (EN 1652)

Temper	Tensile Strength Rm	Yield Strength Minimum $Rp_{0.2}$	Elongation Minimum A_{50mm}	Hardness HV *	Bending 90° gw rel. Bending Radius R/T	Bending 90° bw rel. Bending Radius R/T
	MPa	MPa	%	HV	Strip Thickness ≤ 0.50mm	
R300	300 .. 360	≤ 240	18	80 .. 100	0	0
R360	360 .. 430	270	15	110 .. 135	0	0
R420	420 .. 480	380	10	130 .. 150	0.5	0.5
R480	480 .. 540	430	7	140 .. 160	0.5	0.5
R520	520 .. 580	470	4	≥ 140	2.5	3.5

* only for information

Physical Properties Typical values in annealed temper at 20 °C			
Density		8.91	g/cm³
Thermal expansion coefficient	20 .. 300 °C	16.3	10^{-6}/K
Specific heat capacity		0.38	J/(g·K)
Thermal conductivity		260	W/(m·K)
Electrical conductivity	MS/m	35	MS/m
Electrical conductivity	IACS	60	%
Thermal coefficient of electrical resistance	(0 .. 100 °C)	3.31	10^{-3}/K
Modulus of elasticity	GPa	125	GPa

Electrical Conductivity



Fabrication Properties *

Cold Forming Properties	Good
Machinability (Rating 20)	Good
Electroplating Properties	Excellent
Hot Tinning Properties	Excellent
Soft Soldering, Brazing	Excellent
Resistance Welding	Good
Gas Shielded Arc Welding	Excellent
Laser Welding	Good

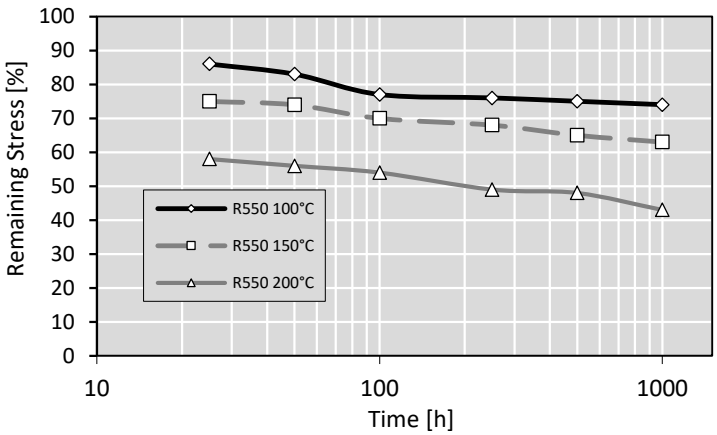
* For more details call our technical service

Corrosion Resistance *

STOL® 194 - CuFe2P has a good resistance in in natural and industrial atmosphere.

Practically resistant against stress corrosion cracking.

Relaxation Properties



Relaxation values give an indication about stress relieve of strip under tension for a certain time and temperature.

Typical test sample thickness is 0.3 – 0.6 mm.

Initial Stress
80% von $Rp_{0,2}$
Parallel Rolling Direction

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.

Available delivery forms *

Strips in coils
Traverse-wound coils with drum weights up to 1.5 t
TECSTRIP®_multicoil up to 2.5 t
Hot-Dip-Tinned strips in thickness range 0.10 up to 1.20 mm

* For more details call our sales service

JUST RIGHT

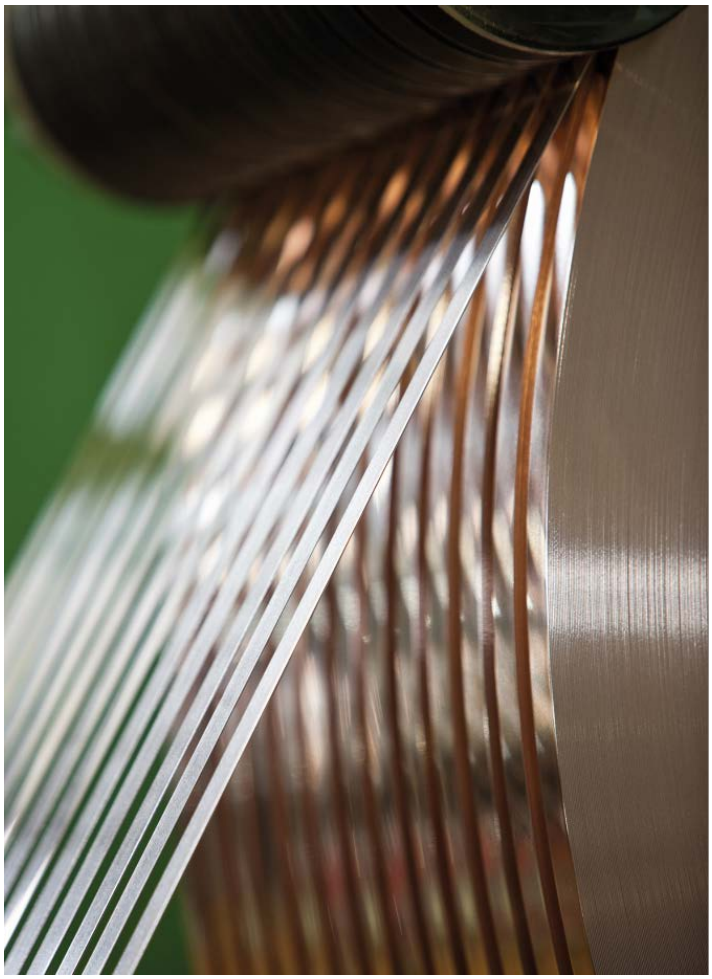
ROLLED MATERIAL FOR INDUSTRIAL APPLICATIONS

KME supplies preliminary strip as well as a wide range of finished strip including industrial strip, transformer strip, cable and HF cable strip, roofing strip and strip sheets.

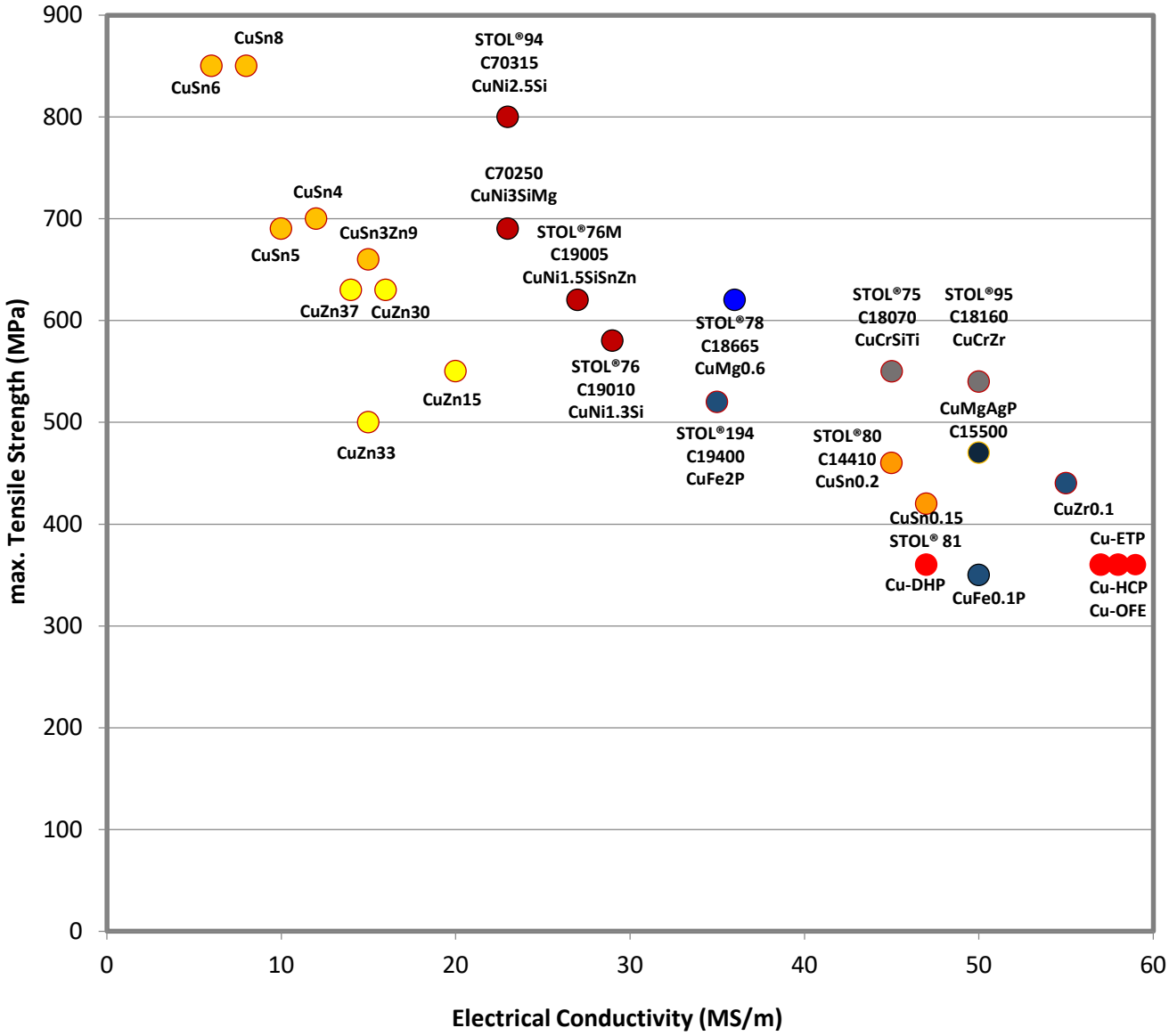
All strip products are manufactured at KME's three main sites on technically well-established equipment.

A wide range of high-performance alloys for demanding applications, e.g. in the automotive industry, e-mobility or the smart home, rounds off our range of materials at the top end.

On request we can also produce plates and discs according to customer specifications.
For special challenges please contact us directly, we are sure that we will find exactly the right material for you.

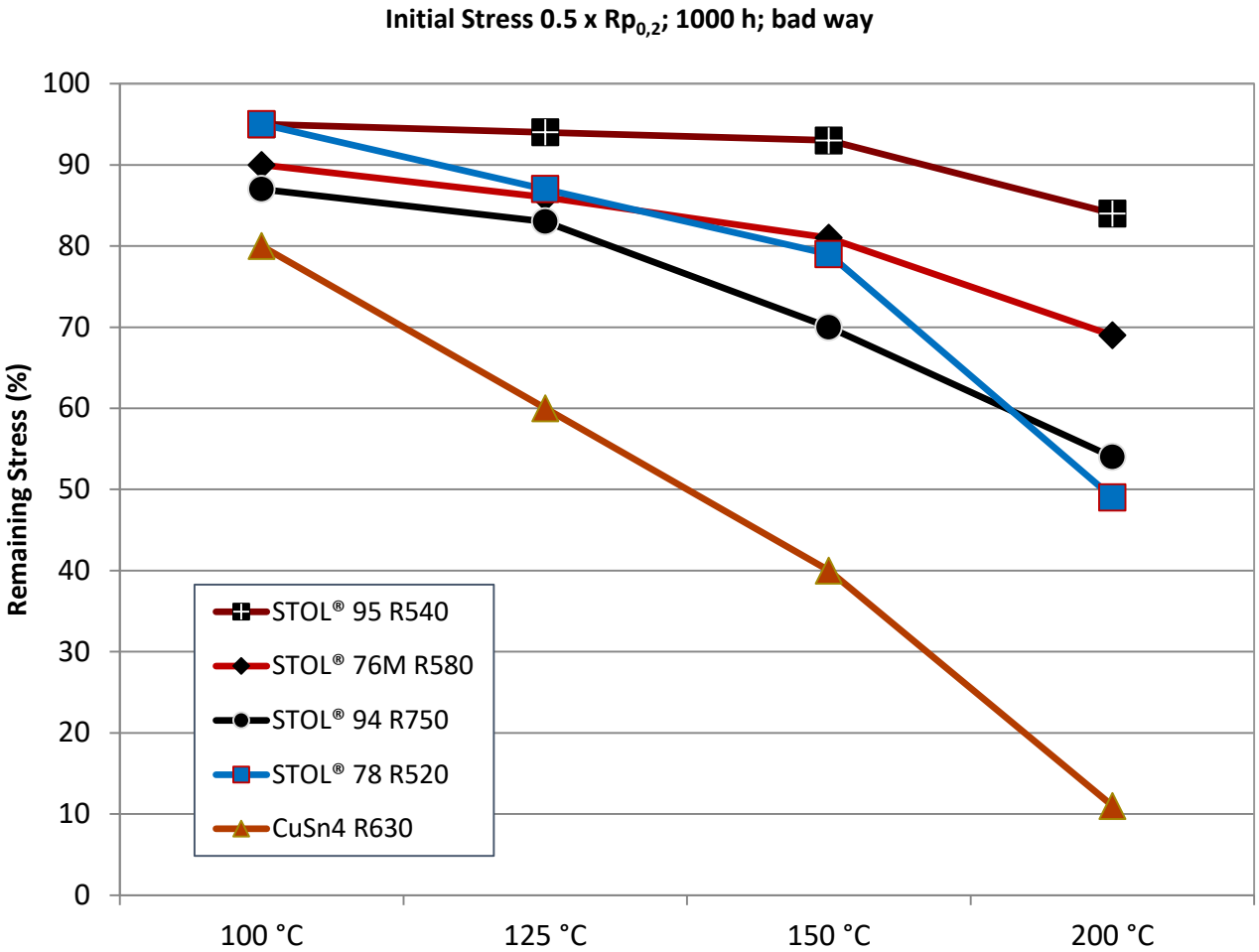


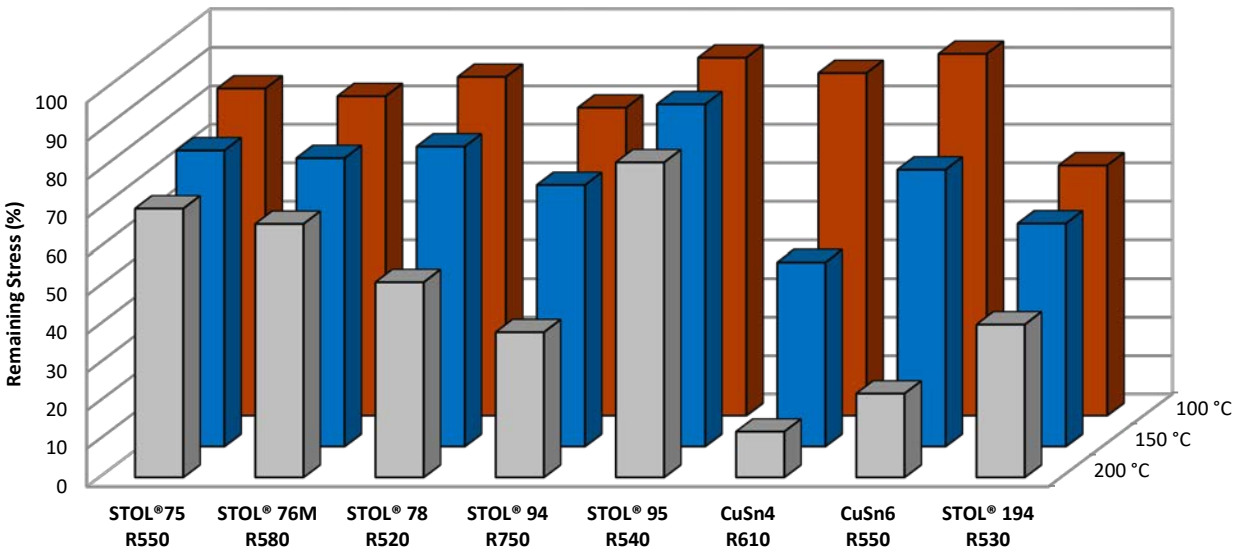
Contact: industrial-rolled-germany@kme.com . Tel +49 (0)541/321-4161

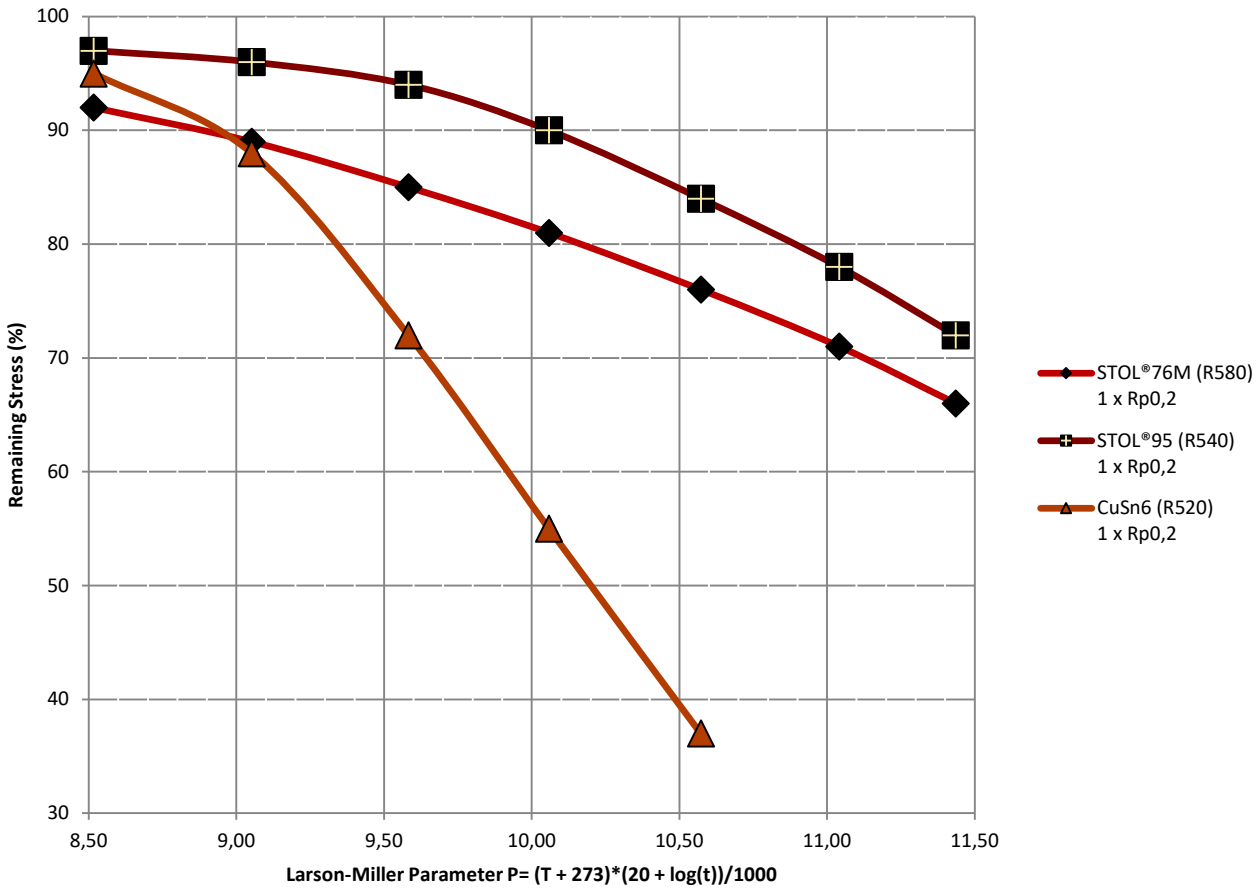

max. Tensile Strength (MPa)
Electrical Conductivity (MS/m)
0
100
200
300
400
500
600
700
800
900
0
10
20
30
40
50
60
CuSn8
CuSn6
STOL®94
C70315
CuNi2.5Si
C70250
CuNi3SiMg
CuSn4
CuSn5
CuSn3Zn9
STOL®76M
C19005
CuNi1.5SiSnZn
CuZn37
CuZn30
STOL®78
C18665
CuMg0.6
STOL®75
C18070
CuCrSiTi
STOL®95
C18160
CuCrZr
CuZn15
STOL®76
C19010
CuNi1.3Si
CuMgAgP
C15500
CuZn33
STOL®194
C19400
CuFe2P
STOL®80
C14410
CuSn0.2
CuZr0.1
CuSn0.15
STOL® 81
Cu-ETP
Cu-DHP
CuFe0.1P
Cu-HCP
Cu-OFE

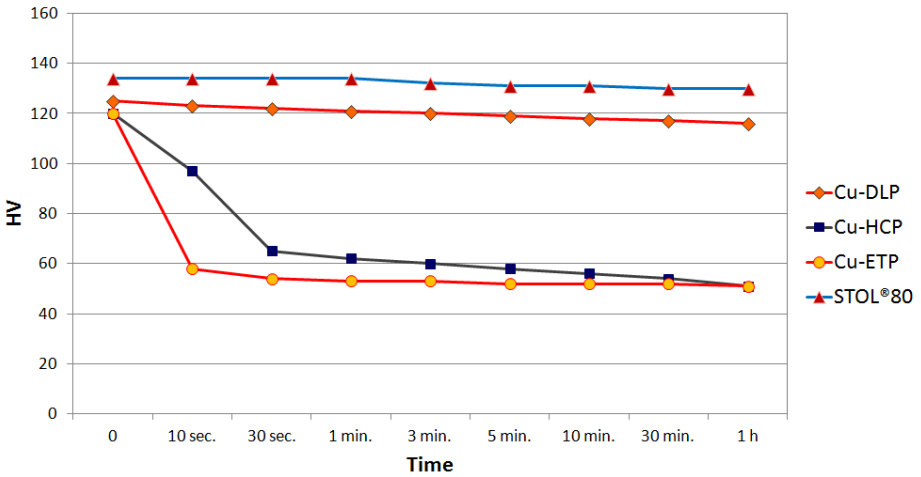
- Definition
  - Gradual decrease of stress under constant elongation.
  -
- KME Method
  - Cantilever - Bending-Test according to ASTM E 328

- Test conditions
  - Temperatures (100° C. / 125° C. / 150° C. / 200° C.)
  - Times (50 h / 100 h / 250 h / 500 h / 1000 h) // long term - Larson-Miller Methode
  - Initial stress (50 % oder 80 % of $Rp_{0,2}$)

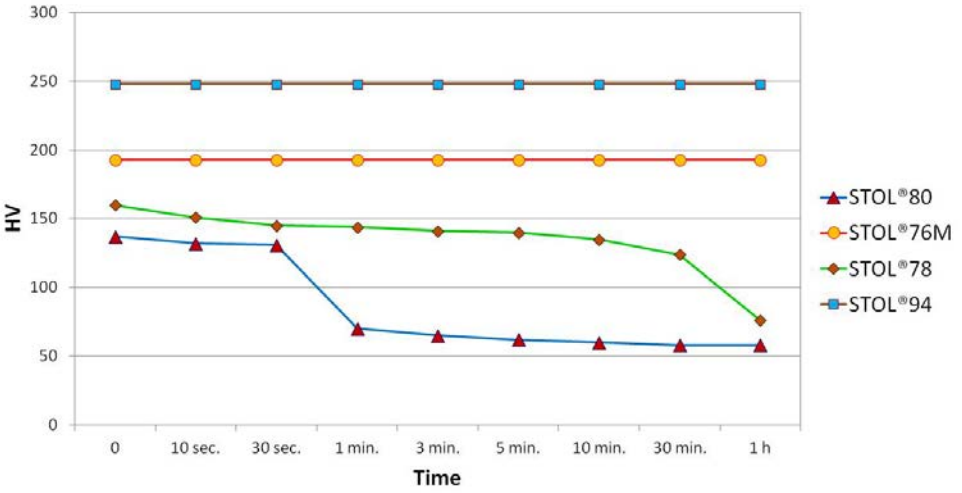



Remaining Stress (%)
100
90
80
70
60
50
40
30
20
10
0
100 °C
150 °C
200 °C
STOL®75 R550
STOL® 76M R580
STOL® 78 R520
STOL® 94 R750
STOL® 95 R540
CuSn4 R610
CuSn6 R550
STOL® 194 R530

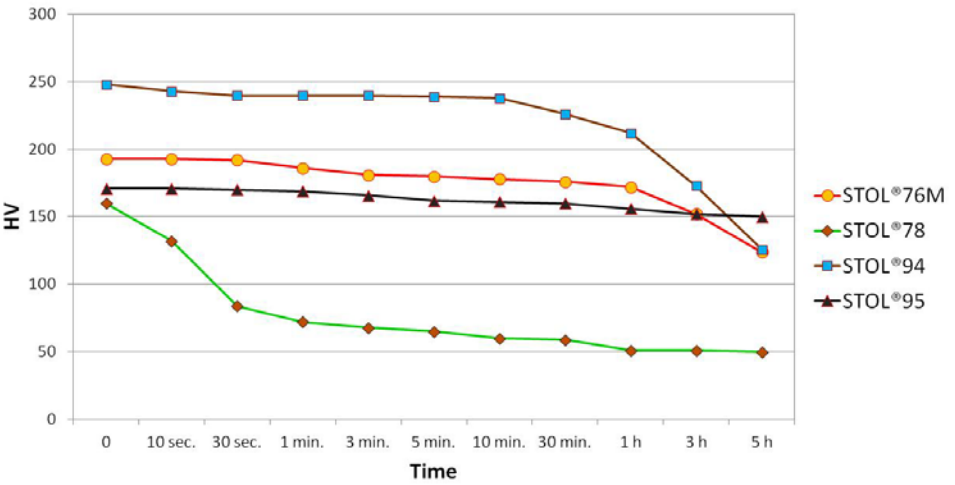

Remaining Stress (%)
100
90
80
70
60
50
40
30
8,50
9,00
9,50
10,00
10,50
11,00
11,50
Larson-Miller Parameter P= (T + 273)*(20 + log(t))/1000
STOL®76M (R580) 1 x Rp0,2
STOL®95 (R540) 1 x Rp0,2
CuSn6 (R520) 1 x Rp0,2



300 °C.

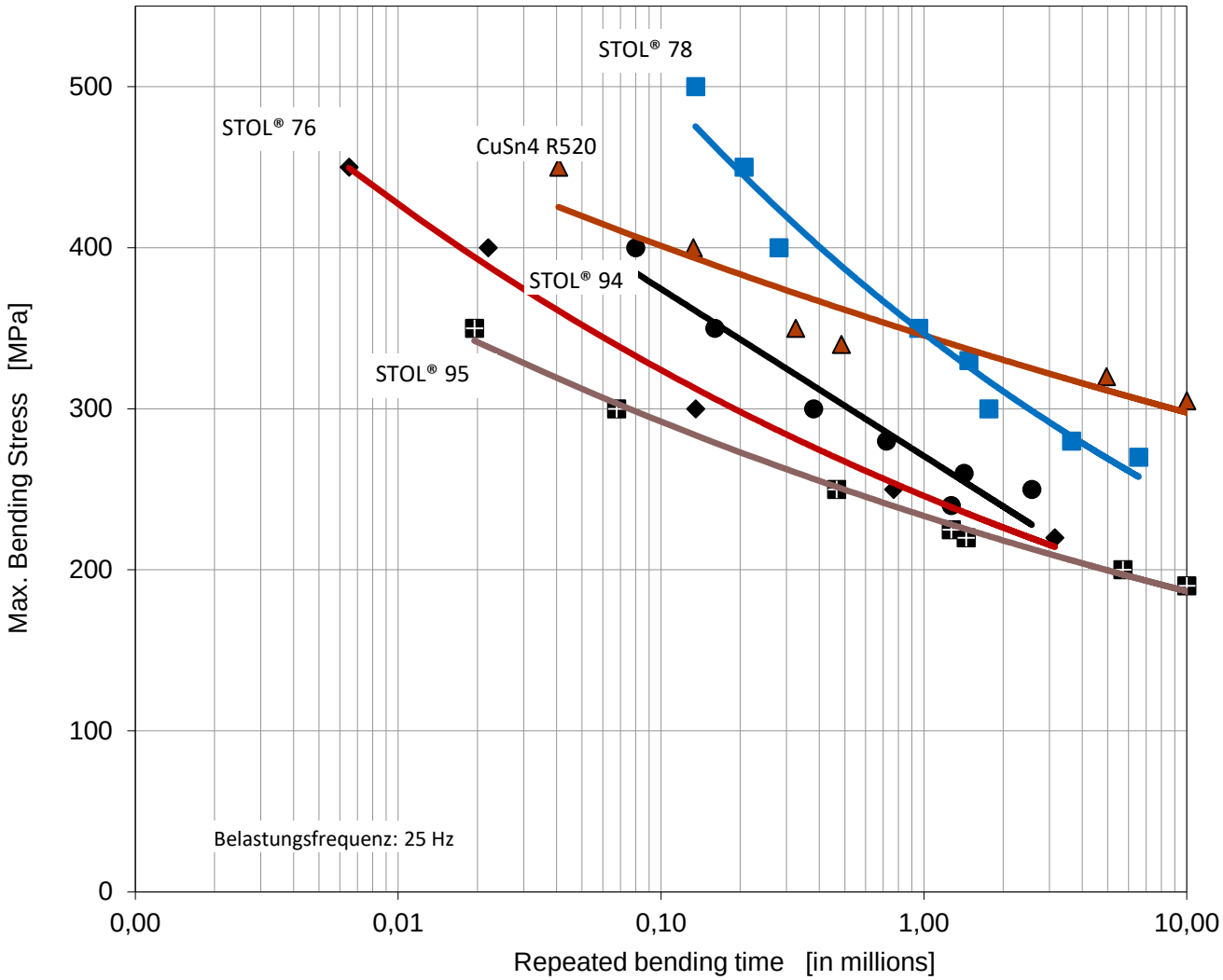


400 °C.

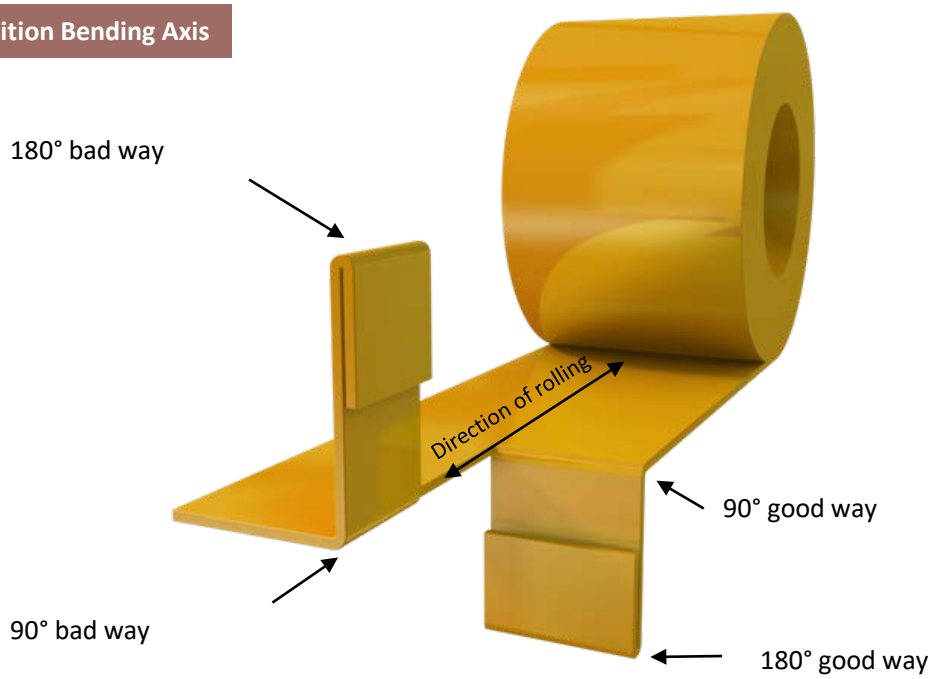


500 °C.

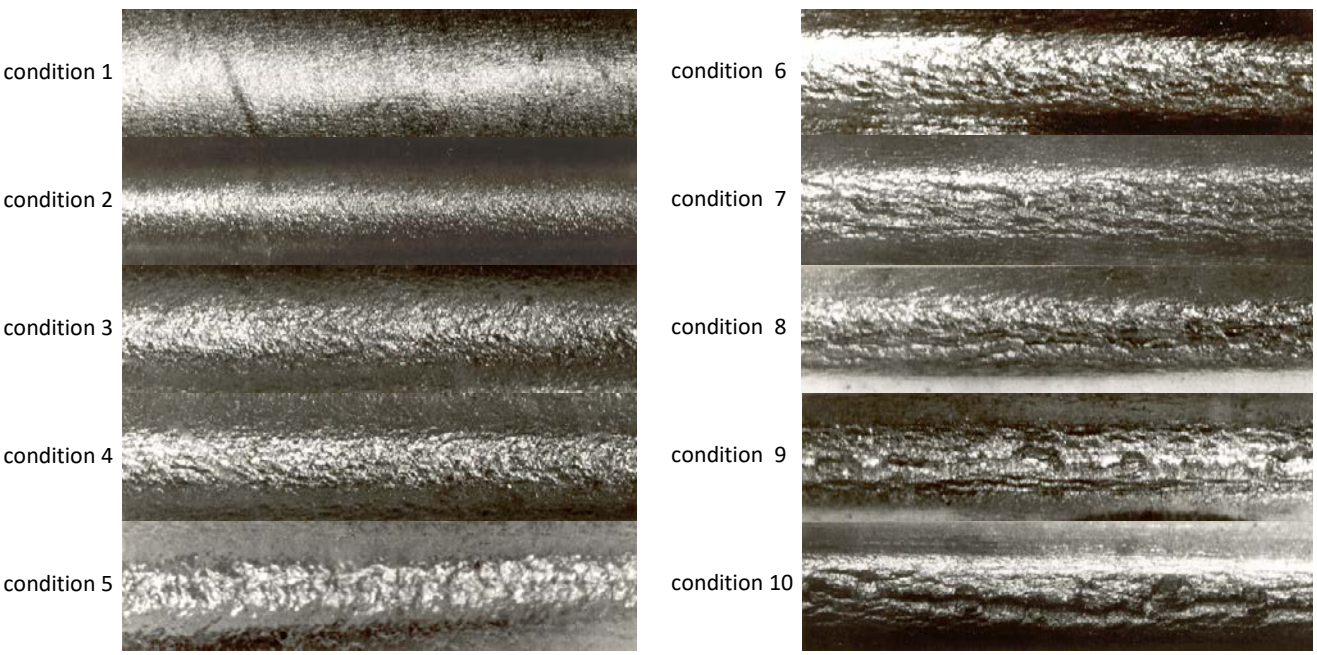
10.3. BEND FATIQUE (at room temperature)



Definition Bending Axis



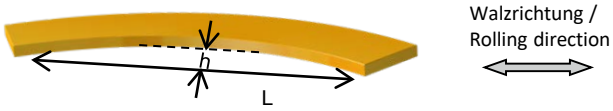
Evaluation of Bending



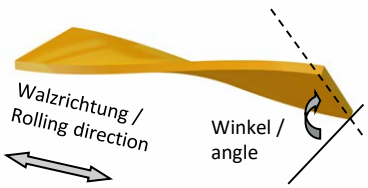
Condition 1	smooth, no cracks (no orange skin, no rough grain)
Condition 2	rough, no cracks (no orange skin, no rough grain)
Condition 3	slight orange skin, no cracks
Condition 4	orange skin, no cracks
Condition 5	strong orange skin, no cracks
Condition 6	very sligth cracks
Condition 7	sligth cracks
Condition 8	cracks
Condition 9	strong cracks
Condition 10	very strong cracks, nearly broken

Test condition, in accordance with DIN ISO 7438, scale in accordance with DIN EN 1654 plus additionally valid for 180° bending.

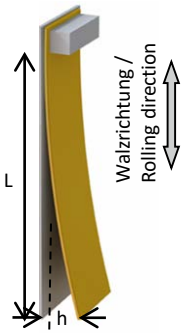
Säbel / Camber



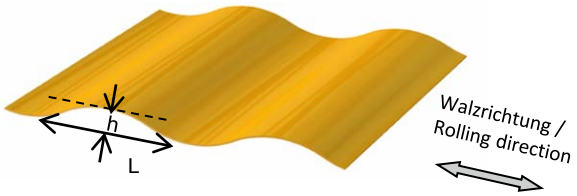
Drall / Twist



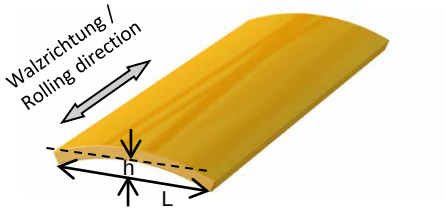
Ausbiegung / Coil set



Planheit / Eveness



Querwölbung / Transverse Flatness



Hot Dip Tinning to DIN EN 13148 (RoHS conform)				
Coatings		pure tin	tin-silver (Sn28M)	termic tin (Sn13)
Strip Thickness (mm)		0.10 – 1.20		
Strip Width (mm)		15 – 330		
Coating thickness (µm)	**0.8 – 2**	✓	-	✓
	1 – 3	✓	✓	-
	2 – 5	✓	✓	-
	3 – 7	✓	✓	-
	4 – 8	✓	✓	-
	5 – 10	✓	✓	-
	10 – 20	✓	✓	-
Comment	**The thickness of the strip with the corresponding limit dimensions is that of the bare condition, unless otherwise agreed. The ordered thickness of tin coating according to DIN EN 13148 must be added.**			

Galvanic Plating to DIN EN 14436 (RoHS conform)		
Coatings	**KME**	Sn/Cu and Sn/Ni, holohedral, Selectively, matt, gloss, Reflow
	External	Sn/Cu or Ni , Ag/Ni or Cu, matt, gloss
Strip thickness	**KME**	0.4 – 2 mm
	External	0.4 – 4 mm
Strip width	**KME**	≤ 170 mm
	External	≤ 400 mm

- KME offers sheets, plates and discs in a wide range of dimensions.
- Our rolling mill is supplied by our own foundries.
- Our strengths lie in a rich range of more than fifty alloys.
- We can also produce plates and discs to customer specific drawings on request.
- In addition to lead-free alloys, we have a large number of special alloys in stock, including bronze and cupronickel.

Copper / Copper alloys

European material descripton		DIN-standard (former)		ASTM	Typical properties / applications	Manufaturing standard
Cu-ETP	CW004A	E-Cu 58 E-Cu 57	2.0065 2.0060	C11000	standard alloy for electrical components, main application in switchgear construction	DIN EN 13599 DIN EN 1652
Cu-HCP Cu-PHC	CW021A CW020A	SE-Cu	2.0070	C10300	hydrogen-resistant, very high conductivity, easy to weld	DIN EN 13599
Cu-OF	CW008A	OF-Cu	2.0040	C10200	hydrogen-resistant, very high conductivity, very easy to weld	DIN EN13599
Cu-OFE	CW009A			C10100	high purity, Cu 99.99% fur vacuum switching systems, targets	DIN EN13604
Cu-DHP	CW024A	SF-Cu	2.0090	C12200	very easy to weld, without particular conductivity requirements	DIN EN1652 DIN EN1653 AD-2000W6/2
CuAg0,1P	CW016A	Cu-Ag0.1P	2.1191	C10700	mould plates, commutator rings, electrodes	DIN EN13599
CuCrZr	CW106C	CuCrZr	2.1293	C18150	mould plates, welding equipment, furnace and mould engineering, heavy current engineering	DIN 17670
CuNi2Si	CW111C	CuNi2Si	2.0855	C18000	mould engineering, machine parts, die casting equipment	by arrangement

Products can be supplied by arrangement in compliance with other international standards such as BS, JIS and GOST.

Individual sheets made of copper – cold-rolled

Width (mm)	Thickness (mm)					
	3 – 4.8	> 4.8 – 6.5	> 6.5 – 8	> 8 – 10	> 10 – 12	> 12 - 35
30 – 670	max. 4000 mm long	max. 4000 mm long	max. 3100 mm long	max. 3100 mm long	max. 2500 mm long	max. 6200 mm long
> 670 - 1000	max. 4000 mm long	max. 4000 mm long	max. 3100 mm long	max. 3100 mm long	max. 2500 mm long	
> 1000 – 1250	max. 4000 mm long	max. 3000 mm long	max. 3100 mm long	*	*	
> 1250 – 1600	max. 4000 mm long	max. 3000 mm long				

* on request

Plates made of copper – hot-rolled

Width (mm)	Thickness (mm)					
	3 – 5	> 5 – 12	> 12 – 20	> 20 – 60	> 60 – 200	> 200
30 – 1000	max. 6000 mm long	max. 8000 mm long	max. 4000 mm long	max. 6200 mm long	max. 4000 mm long	*
> 1000 – 2500	max. 6000 mm long	max. 8000 mm long	max. 4000 mm long	max. 6200 mm long	*	*
> 2500 – 3000		*	max. 4000 mm long	max. 4000 mm long		
> 3000 – 3200			*	max. 4000 mm long		
> 3200			*	*		

* on request

Brass (lead free)						
European material descripton		**DIN standard (former)**		**ASTM**	**Typical properties/application**	**Manufacturing standard**
CuZn5	CW506L	CuZn5	2.0220	C21000	Alloy with very good cold formability; well suited to pressing, embossing, enchasing. Application: installation components for electrical engineering, construction industry, facades, jewellery Industry.	DIN EN 1652
CuZn10	CW501L	CuZn10	2.0230	C22000		DIN EN 1652
CuZn15	CW502L	CuZn15	2.0240	C23000		DIN EN 1652
CuZn20	CW503L	CuZn20	2.0250	C24000		DIN EN 1652
CuZn28		CuZn28	2.0261		Alloy with very good cold formability achieved by deep-drawing, pressing, riveting, crimping. Application: cooling plates, musical instruments, every type of deep-drawn part, flat springs, ammunition.	DIN EN 1652
CuZn30	CW505L	CuZn30	2.0265	C26000		DIN EN 1652
CuZn33	CW506L	CuZn33	2.0280	C26800	Alloy with very good cold formability, especially suitable for crimping and cold-upsetting.	DIN EN 1652
CuZn36	CW507L	CuZn36			Main alloys for the application of brass materials; highly suitable for cold forming by means of deep-drawing, pressing, upsetting, rolling, thread rolling, embossing, bending; easy to solder and weld; suitable for electrolytic polishing. Application: etching quality e.g. clock and watch faces, furniture industry.	DIN EN 1652
CuZn37	CW508L	CuZn37	2.0321	C27200		DIN EN 1652
CuZn40	CW509L	CuZn40	2.0360	C28000	Alloy with good hot and cold formation properties; suitable for bending, riveting, upsetting and crimping and, in its soft state, for embossing as well as deep-drawing; better machinability than CuZn5 to CuZn37. Application: capacitor bases, facades, apparatus engineering, furniture fittings.	DIN EN 1652

Brass (leaded)

European material descripton		DIN-Norm (former)		ASTM	Typical properties/application	Manufacturing Standard *
CuZn39Pb0,5	CW610N	CuZn39Pb0.5	2.0372	C36600	Alloy with good cold and hot formability combined with adequate machinability. Application: bending, riveting, upsetting, crimping, tube sheet plates	DIN EN 1652
CuZn39Pb2	CW612N	CuZn39Pb2	2.0380	C37700	Alloy with good cold and hot formability combined with very good machinability; limited cold formability by means of bending, riveting, crimping; good for punching. Application: turning, drilling and milling quality, tool making, fixtures, engraved plates	DIN EN 1652

Special brass

CuZn20Al2As	CW702R	CuZn20Al2As	2.0460	C68700	Alloy with arsenic to improve dezincification resistance. Application: capacitors, seawater applications, welded tubes.	DIN EN 1652
CuZn28Sn1		CuZn28Sn1	2.0470	C44300	Alloy with improved dezincification resistance and conditional seawater resistance. Application: capacitors, heat exchangers, apparatus engineering.	DIN EN 1652
CuZn38AlFeNiPbSn	CW751R	CuZn38-AlFeNiPbSn	2.0525	C47000	Alloy with higher strength combined with good machinability. Application: apparatus engineering, capacitors, heat exchangers.	DIN EN 1653
CuZn38Sn1(As)	CW717R	CuZn38Sn1(As)	2.0530	C46400 (C46500)	Alloy with good corrosion-resistance. Application: capacitors, heat exchangers, apparatus engineering, cladding.	DIN EN 1653

Other alloys are available on request, for which we are excellently equipped with our modern alloy foundry.
We can cast blocks of up to 15 tons, and finished plates can weigh up to around 10 tons depending on alloy.

* on request

Individual sheets made of brass – cold-rolled

Width (mm)	Thickness (mm)					
	3 – 4.8	> 4.8 – 6.5	> 6.5 – 8	> 8 – 10	> 10 – 12	> 12 - 35
30 – 670	max. 4000 mm long	max. 4000 mm long	max. 3100 mm long	max. 3100 mm long	max. 2500 mm long	max. 6200 mm long
> 670 - 1000	max. 4000 mm long	max. 4000 mm long	max. 3100 mm long	max. 3100 mm long	max. 2500 mm long	
> 1000 – 1250	max. 4000 mm long	max. 3000 mm long	max. 3100 mm long	*	*	
> 1250 – 1600	max. 4000 mm long	max. 3000 mm long				

* on request

Plates made of brass – hot-rolled

Width (mm)	Thickness (mm)					
	3 – 5	> 5 – 12	> 12 – 20	> 20 – 60	> 60 – 200	> 200
30 – 1000	max. 6000 mm long	max. 8000 mm long	max. 4000 mm long	max. 6200 mm long	max. 4000 mm long	*
> 1000 – 2500	max. 6000 mm long	max. 8000 mm long	max. 4000 mm long	max. 6200 mm long	*	*
> 2500 – 3000		*	max. 4000 mm long	max. 4000 mm long		
> 3000 – 3200			*	max. 4000 mm long		
> 3200			*	*		

* on request

Cupronickel alloys

European material descripton		DIN standard (former)		ASTM	Typical properties/application	Manufacturing Standard *
CuNi5-Fe1Mn		CuNi5-Fe1Mn			Alloy with good resistance against seawater, erosion and corrosion, and good weldability. Application: offshore, maritime Applications	GOST
CuNi10-Fe1Mn	CW352H	CuNi10-Fe1Mn	2.0872	C70620	Alloy with good resistance against seawater, erosion and corrosion, and good weldability. Application: apparatus engineering, tube sheet plates, seawater processing, welded tubes, maritime applications, cladding	DIN EN 1652
CuNi30-Mn1Fe	CW354H	CuNi30-Mn1Fe	2.0882	C71500	Alloy with outstanding resilience against seawater, erosion and corrosion (because it contains more nickel) and good weldability. Application: apparatus engineering, tube sheet plates, seawater processing, maritime applications, cladding	DIN EN 1652

Copper-tin-alloys

CuSn4	CW450K	CuSn4	2.1016	C51100	Alloy with very good cold formability and corrosion-resistance, easy to soft- and hard-solder and good electrical conductivity (within its material group); higher strengths than copper.	DIN EN 1652
CuSn5	CW451K	CuSn5		C51000	Alloy with good cold formability and corrosion-resistance; insensitive to stress corrosion cracking; Application: electrical industry, automotive engineering, facades, monuments, works of art.	DIN EN 1652
CuSn6	CW452K	CuSn6	2.1020	C51900	Alloy with good cold formability and very good corrosion-resistance; easy to solder. Application: all types of spring, especially electrical industry; flexible metal tubes, facades, monuments, works of art.	DIN EN 1652
CuSn8	CW453K	CuSn8	2.1030	C52100	Alloy with good cold formability; higher abrasion resistance, corrosion-resistance, strength, hardness than CuSn6; good sliding properties. Application: sliding elements, especially for thin-walled sliding bearing bushings and sliding strips, springs.	DIN EN 1652

Copper-aluminium alloys

European material descripton		DIN-Norm (former)		ASTM	Typical properties/application	Manufacturing Standard
CuAl8Fe3Sn				C61300	main properties: alloys with high strengths compared with copper materials (including at higher temperatures) combined with outstanding corrosion-resistance against neutrals and acids, watery media and seawater; good resilience against scaling as well as erosion and cavitation; we can gladly advise on special requirements and help you select the right alloy.	DIN EN 1652
CuAl8Fe3	CW303G	CuAl8Fe3		C61400		
CuAl11Fe3		CuAl11Fe3		C62400		
CuAl9Mn2		CuAl9Mn2	2.0960		Application: highly stressed bearing components, sliding strips	DIN EN 1652
CuAl10-Fe3Mn2	CW306G	CuAl10-Fe3Mn2	2.0936	CA104	Application: chemical apparatus engineering, scaling-resistant parts.	BS
CuAl10-Ni5Fe4	CW307G	CuAl10-Ni5Fe4	2.0966	C63000	Application: maximum-strength parts, highly stressed bearing components, wearing parts, ship propellers, chemical apparatus engineering, tube sheet plates, maritime applications, potash industry.	DIN EN 1652

Special alloys

CuAsP		CuAsP	2.1491	only BS C107	Higher corrosion-resistance and less tendency to scale than pure copper. Application: fireboxes.	Only BS C107
CuSi3Mn		CuSi3Mn	2.1525	C66500	Apparatus engineering, heat exchangers, chemical industry, construction industry, crafts.	
CuMn2		CuMn2	2.1363		Chemical Apparates Engineering.	
C67000	CW704R			C67000	High strength, high static and dynamic loading capacity.	

Cupronickel, dimensions

Width (mm)	Thickness (mm)					
	3 – 5	> 5 – 12	> 12 – 20	> 20 – 60	> 60 – 200	> 200
30 – 1000	max. 6000 mm long	max. 8000 mm long	max. 4000 mm long	max. 6200 mm long	max. 4000 mm long	*
> 1000 – 2500	max. 6000 mm long	max. 8000 mm long	max. 4000 mm long	max. 6200 mm long	*	*
> 2500 – 3000		*	max. 4000 mm long	max. 4000 mm long		
> 3000 – 3200			*	max. 4000 mm long		
> 3200			*	*		

* on request

Copper-aluminium (aluminium bronze)

Width (mm)	Thickness (mm)				
	0 – 1250	> 1250 – 1600	> 1600 – 2000	> 2000 – 3000	> 3200
3 – 5	max. 3050 mm long				
> 5 – 12	max. 3050 mm long	max. 3050 mm long	*		
> 12 – 20	max. 3050 mm long	max. 3050 mm long	max. 3050 mm long	*	
> 20 – 60	max. 4000 mm long	max. 4000 mm long	max. 4000 mm long	*	*
> 60 - 130	max. 4000 mm long	max. 4000 mm long	max. 4000 mm long		
> 200	*	*			*

* on request

The storage of our blank and coated strip and stamped products (hereinafter referred to as "products") may influence their quality.

Insofar as the above mentioned products are stored at consistent room temperature in a dry atmosphere and in undamaged packaging, the following applies with regard to mechanical properties, surface condition and workability:

Mechanical properties

The mechanical product properties (including roughness) for our products are in any case given at least for the duration of the legally required warranty period; during this period, the layer thickness, verifiable using the X-ray fluorescence method, also remains the same.

Surface condition

- Products protected „preserved“ with oil are protected against oxidation for up to three months.
- Bare surfaces passivated with Benzotriazole or other media are protected against oxidation for up to six months.
- Finished surfaces oxidize in the Angstrom area and can increasingly develop a slightly yellowish to black layer. However, when processed within one year, this layer is regularly removed by the relative movement during plugging due to the contact forces applied.

Processing of products with coating

- Solderability/wettability can be impaired by the diffusion-controlled growth of the intermetallic phases, especially with thin tin layers. For precious metal coatings (e.g. with silver or gold) of products, we would recommend passivation.
- If the storage conditions described above are observed, perfect processing can be guaranteed for up to half a year, depending on the coating process. Beyond that, however, the manufacturer's specifications of the respective coater have priority.

For the purposes of completeness only, we would like to point out that the above-mentioned Information does not extend to further processed products. Influences resulting from further processing - at your site or in the further supply chain - do not fall within our area of responsibility and must be taken into account on your part.

KME - WITH GREAT IDEAS FOR THE FUTURE

KME AS AN EMPLOYER

PROFOUND KNOWLEDGE, INNOVATIVE PRODUCTS MANUFACTURED FROM COPPER OF OUTSTANDING TECHNOLOGICAL QUALITY, ENVIRONMENTALLY FRIENDLY PRODUCTION AND A STRONG TEAM. MORE THAN GOOD REASONS FOR STARTING A CAREER WITH KME. WITH US, YOU BECOME PART OF A LARGE MEDIUM-SIZED INDUSTRIAL BUSINESS WITH INTERNATIONAL ORIENTATION.

With a workforce of more than 4,019 in Europe, Asia and the USA, we manufacture semi-finished and special products made of sustainable copper and copper alloys. Our product portfolio for users from the most various industrial sectors offers a wide range of high-tech solutions with high product quality and is available worldwide.

The comprehensive know-how of our employees is the most important prerequisite for our success; together, we are working on innovative solutions for the future. Therefore, KME places special focus on industrial safety, wellbeing and, above all, the health of our employees, because the international KME team is our most valuable asset. We provide advanced training with commitment and accompany our employees individually on the way into a joint future with great ideas. Copper is the future! Perhaps it will soon be yours, too – with KME.

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Due to continued improvements within our production process, the details stated in our brochure can not be guaranteed.
We reserve the right to update or amend our products, without prior notification.
We suggest that you obtain confirmation of our product details / specifications prior to committing to specific alloys.

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