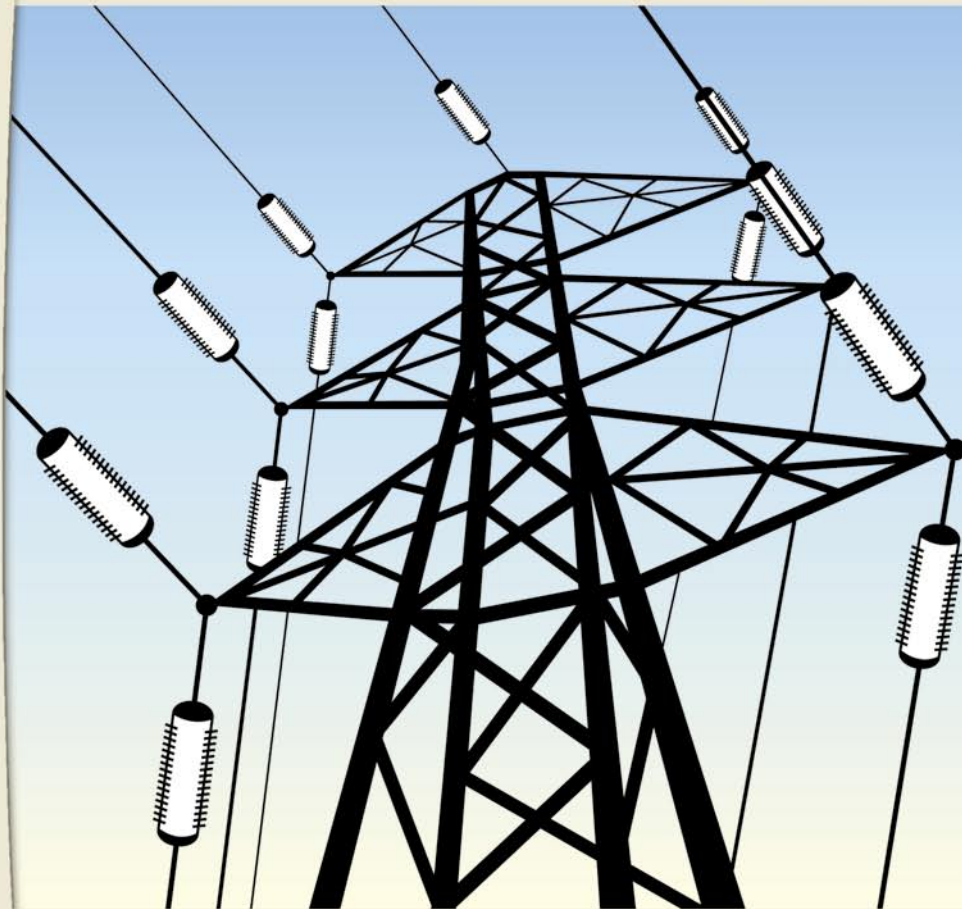


**Wieland**



Semi-finished products in copper and  
copper alloys for power engineering

# Semi-finished products in copper and copper alloys – Basic element of power engineering

## Copper materials

Electrical energy is an integral part of modern society. Almost all equipment in daily use requires electricity. It is therefore vital to have an energy supply that works well. In order to guarantee this, power engineering provides technical solutions from power generation to energy usage.

Copper and copper alloys play a key role in power engineering, particularly due to a combination of the following characteristics:

- Electrical conductivity
- Corrosion resistance
- Strength
- Formability
- Machinability
- Suitability for electroplating
- Availability

## Applications

Strip, tube, sections, rods and wires made of copper alloys are basic material used in a multitude of components for power engineering. Applications include:

**Power generation:** e.g. generators, switching equipment and for earthing.

**Electrical transmission:** e.g. for electricity supply and output.

**Transformation:** e.g. in transformers

**Distribution:** e.g. in switch gear and installation engineering

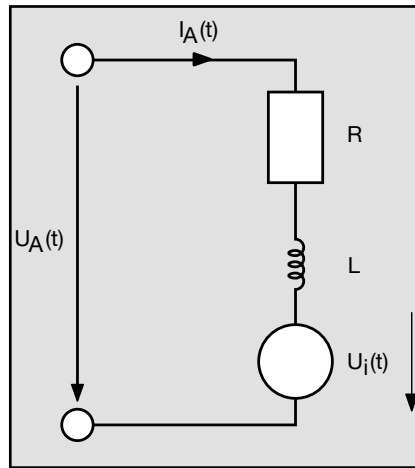
**Conversion:** e.g. in motors and frequency converters.

## Partnership

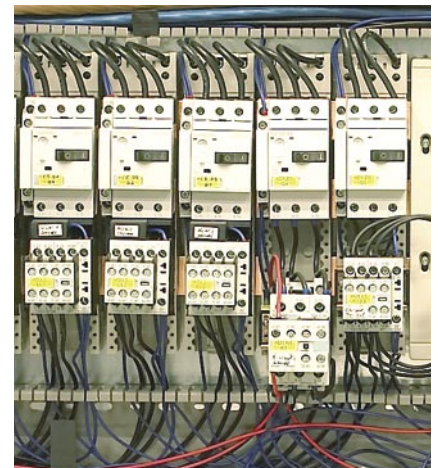
From casting of raw materials to a variety of available components, Wieland-Werke AG manufactures customized materials in-house for power engineering. We provide expert assistance to our customers and pride ourselves on being an innovative partner. An experienced Technical Marketing staff is available to you, providing useful advice and technical support in regard to the correct choice of semi-finished products and their development. In addition, Wieland-Werke AG also has scientists and engineers at your disposal when considering the development of new alloys or simply requiring more information on material specifications.



Power generation



Conversion



Distribution

# Rods and sections for power engineering

Rods and sections made of copper and copper alloys are used for a number of components in power engineering such as terminals and commutators.

Especially sections are becoming ever more important to assure an economical production. In many cases, cutting the section to length is sufficient to make the required finished part.

The efficient use of sections leads to new, less expensive processing. Moreover, sections are particularly good due to a number of qualitative advantages, e.g. good strength properties through cold working all around the profile.

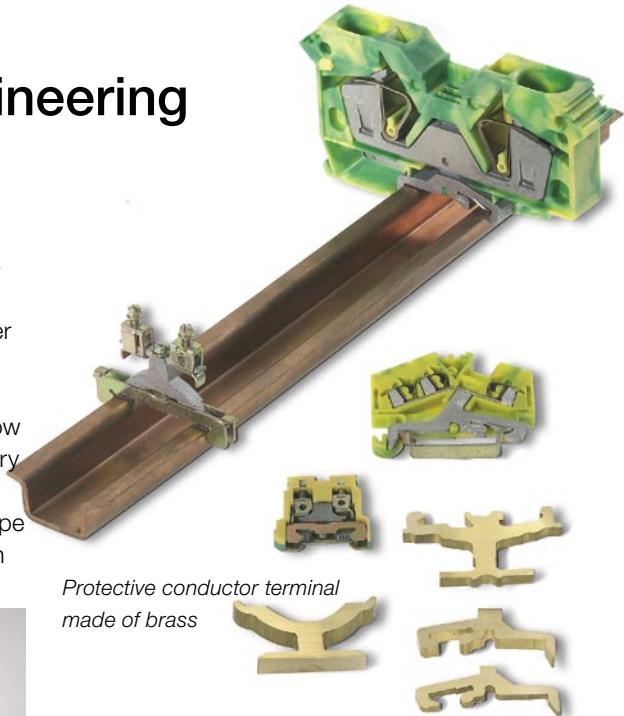
Advances in materials, manufacturing processes and tool making allow ever more complicated shapes to be achieved.

Through our own tool-making experience we have unique expertise in the production of sections, amongst other things.

Sections are supplied in solid or hollow shapes. It is the material and geometry of the profile which largely determine whether a section can be made. Shape and dimensions are usually defined in a drawing.



House terminal made of brass



Protective conductor terminal made of brass

Basic shapes that can be supplied and process-related limits are given in EN 13605. Please do not hesitate to contact us so that we can advise you whether your desired shape can be manufactured.

## Round rods

Diameter	2 - 250 mm	0.08 - 10 "
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## Polygonal rods

Width across flats	3 - 100 mm	0.12 - 4 "
Rectangular	max. 80 x 150 mm	max. 3 x 6 "

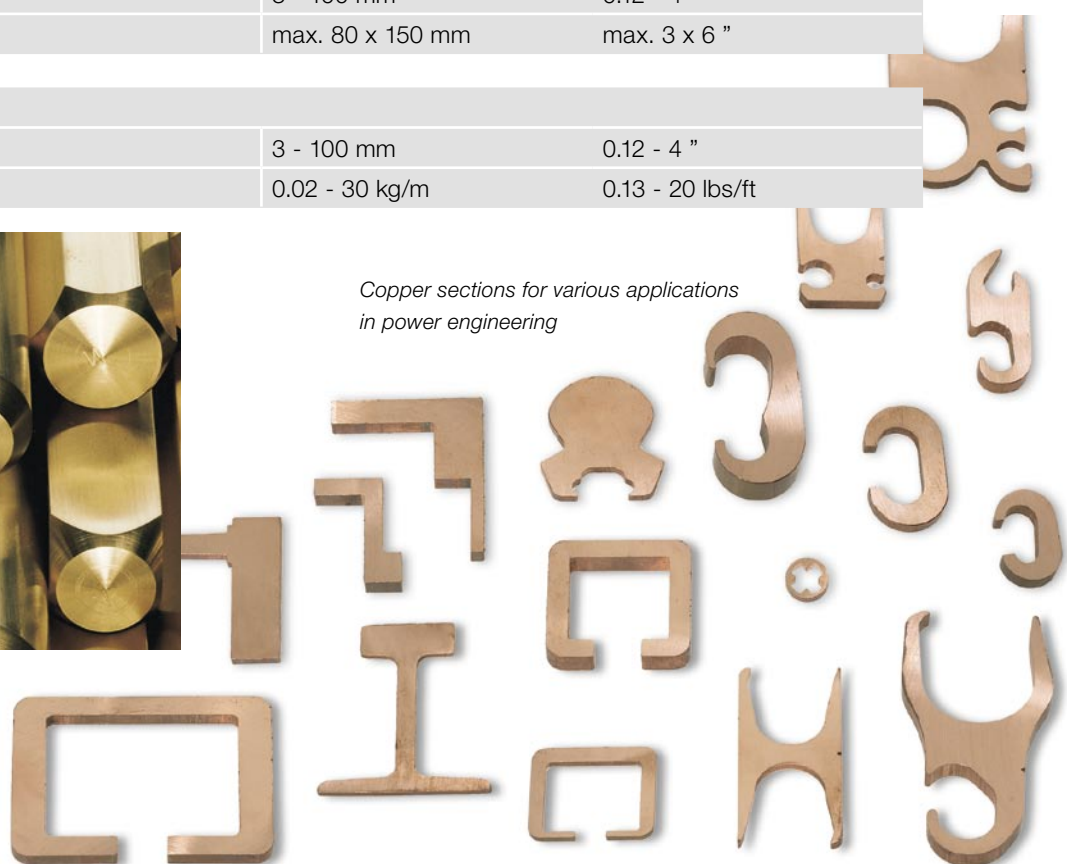
## Sections

Diameter of circumscribing circle	3 - 100 mm	0.12 - 4 "
Specific meter weight	0.02 - 30 kg/m	0.13 - 20 lbs/ft



Brass rods for machined parts

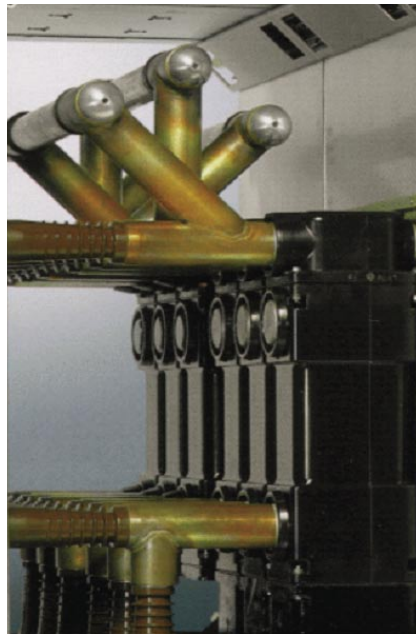
Copper sections for various applications in power engineering



# Tubes and sectional tubes for power engineering

Tubes and sectional tubes made of copper and copper alloys are also important base materials for power engineering components. Applications include generators, switchboards and cable shoes.

We supply precision tubes according to EN 13600 and EN 12449, but offer considerably tighter restricted tolerances. We can supply tubes with an outside diameter of up to 300 mm. The wall thickness depends on the outside diameter, the internal sectional area however should be a minimum of 20 mm<sup>2</sup>. Sectional tubes are customized solutions, individually adapted to the needs of the customer. Particularly sectional tubes which are drawn from round tubes stand out due to the constant wall thickness and small differences in wall thickness.



*Copper tubes in medium voltage distributors*



*Copper tubes for cable shoes*

The same applies to sectional tubes as it does to sections – the sooner you contact us the better.

## Tubes

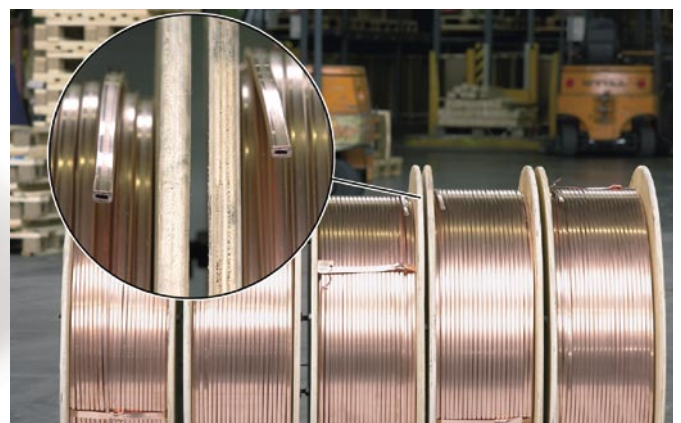
Manufacturable lengths	up to 18,000 mm, cut lengths on request	
Outside diameter	4 - 300 mm	0.16 - 12 "
Wall thickness	0.28 - 40 mm	0.01 - 1.6 "

## Sectional tubes

Outside diameter	5 - 230 mm	0.2 - 9 "
Wall thickness	0.1 - 17.5 mm	0.004 - 0.7 "



*Square copper tubes*



*Generator tubes*

# Wire and sectional wire for power engineering

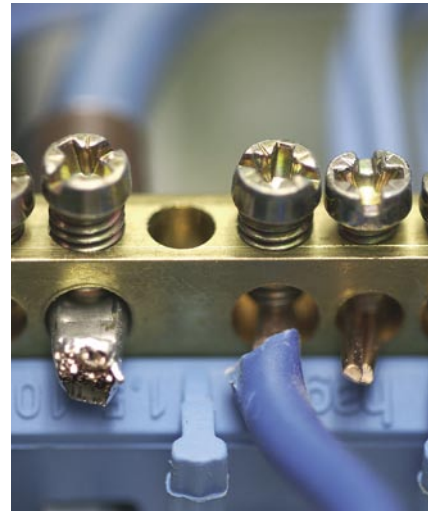
Wire and sectional wire made of copper and copper alloys are irreplaceable as base material for conductors and many other applications in power engineering, such as connectors, netting for screens, etc.

Our forte is meeting very specific product demands. We offer high-performance copper alloys which combine high conductivity and reasonable strength. Furthermore, shapes up to a cross section of 100 mm<sup>2</sup> can be supplied as sectional wire. The advantage: extended machining runs, for example, due to the 1,000 kg coil.

Beside the shape, the type of supply as well as the type of winding and packaging of the wire must be established. For sectional wires we recommend arranging the position of the wire within the coil.



*High-voltage plugs made of round wire*



*Terminal blocks made of brass wire*

Other details in regard to types of delivery can be found in our brochure - Types of delivery and packing, Extruded and drawn products - which we will be pleased to send to you on request.

## Polygonal wire

Width across flats	2 - 10 mm	0.08 - 0.4 "
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## Round wire

Diameter	0.3 - 14 mm	0.012 - 0.6 "
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## Sectional wire

Diameter of the circumscribing circle	2.5 - 20 mm	0.1 - 0.8 "
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*Wire wound onto uncoiling devices*

*Coiled wire*



# Strip for power engineering

Strip made of copper and copper alloys is also used for different applications in power engineering. These include:

- Distribution transformers
- Energy distribution
- Electricity for industry
- Connectors
- Terminal blocks
- Electronic components
- Printed circuit board components

Strip made of pure copper is used for power transformation in distribution transformers because of its excellent electrical conductivity. The edges of the strip are free of burrs or rounded in order to avoid short-circuiting.



Socket elements manufactured from hot-dip tinned brass strip

For connectors, the most commonly used materials are brass and phosphor bronze. They have to fulfil many requirements – good bending properties and spring characteristics, corrosion resistance, low mating forces and

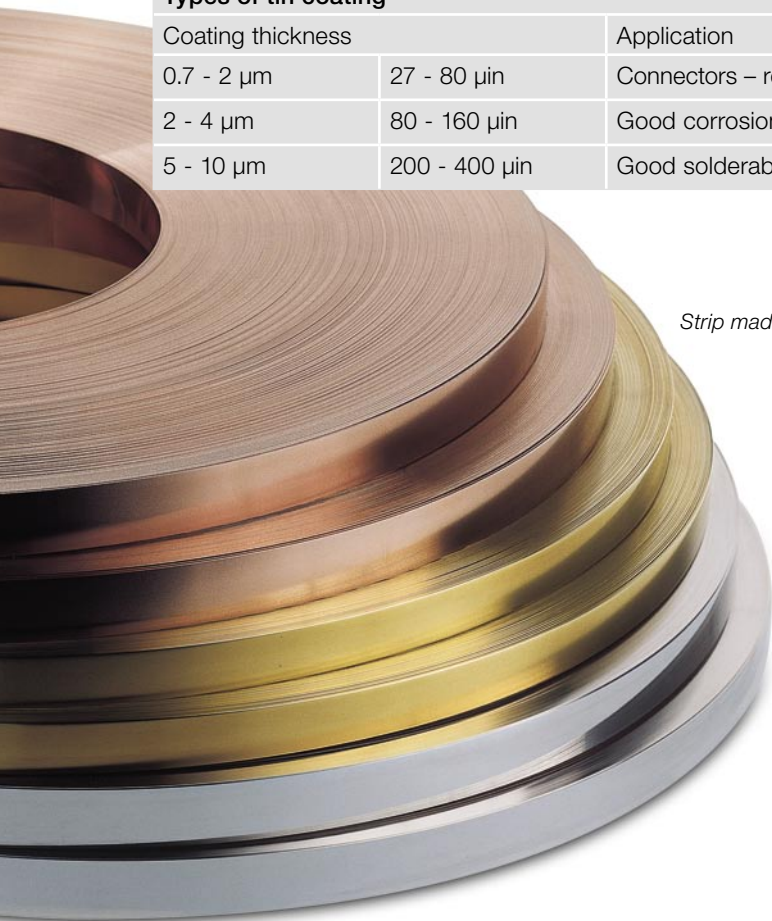
low relaxation. When high strength as well as good electrical conductivity are required, Wieland high-performance alloys are the right solution.

Our copper products are also used in house building and construction engineering. Traditional materials such as brass and bronze play an important role here. They are easy to process (stamping / forming) and have excellent soldering characteristics in addition to other advantages.

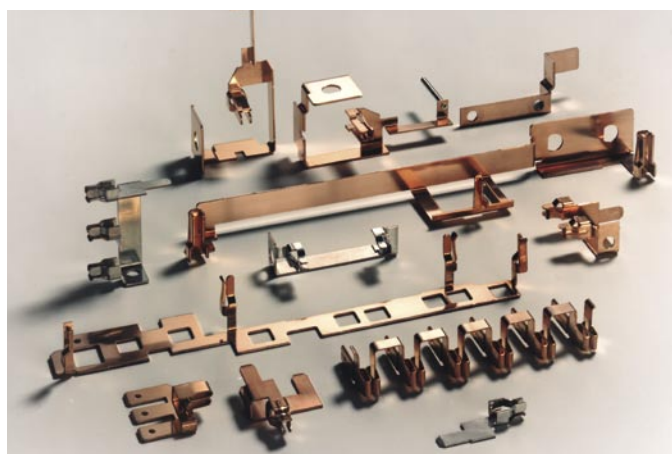
In many cases the strip surface is functionally coated. Wieland offers different types of hot-dip tin coating. Additional information can be found in our tin coating brochure. Please address further questions to our staff in Technical Marketing.

Strip		
Thickness	0.1 - 4.0 mm	0.004 - 0.16 "
Width	6 - 400 mm	0.25 - 16 "

Types of tin coating					
Coating thickness		Application	SnPUR®	SnTOP®	SnTEM®
0.7 - 2 µm	27 - 80 µin	Connectors – reduced mating forces	x	x	x
2 - 4 µm	80 - 160 µin	Good corrosion resistance	x	x	
5 - 10 µm	200 - 400 µin	Good solderability	x	x	



Strip made of various copper alloys



Parts made of Wieland high-performance alloys

# Materials and semi-finished products supplied

Material					Types of semi-finished products				Cold working	Machining	Resistance welding	Electrical conductivity (reference value) in % IACS
Wieland	EN designation		UNS	JIS	Strip	Tube / sectional tube	Rod and wire	Section, sectional wire				
	Symbol	Number	Number	Number								
K09/K10	Cu-OFE	CW009A	C10100	C1011	•	•/•	•	•	↑	↓	→	101
K11	Cu-OF	CW008A	C10200	-	•	-/-	-	-	↑	↓	→	100
K12	Cu-HCP	CW021A	C10300	-	•	•/•	•	•	↑	↓	→	98
K14	Cu-PHC	CW020A	C10300	-	•	-/-	-	-	↑	↓	→	100
K15	Cu-DLP	CW023A	C12000	C1201	•	-/-	-	-	↑	↓	→	90
K16	Cu-ETP1	CW003A	C11000	C1100	-	-/-	•	•	↑	↓	→	102
K19/K20	Cu-DHP	CW024A	C12200	C1220	•	•/•	•	•	↑	↓	→	77
K30	Cu-OF	CW008A	C10200	-	-	•/•	•	•	↑	↓	→	100
K32	Cu-ETP	CW004A	C11000	C1100	•	•/•	•	•	↑	↓	→	100
K41	CuNi1Pb1P*	-	C19150	-	-	-/-	•	•	↗	→	↓	50
K55	CuNi3Si1Mg*	-	C70250	-	•	-/-	•	-	↗	→	→	43
K65	CuFe2P	CW107C	C19400	-	•	•/•	•	-	↗	↓	→	60
K75	CuCrSiTi*	-	C18070	-	•	-/-	-	-	↗	↓	→	77
K81	CuSn0, 15	CW117C	C14415	-	•	-/-	•	-	↑	→	→	85
K88	CuCrAgFeTiSi*	-	C18080	-	•	-/-	•	-	↗	↓	→	80
KA1	CuAg0, 1P	CW016A	C11600	-	-	•/•	•	•	↑	↓	→	98
KA9	CuNi2SiCr*	-	C81540	-	-	•/•	•	•	↗	→	→	40
KC1	CuPb1P	CW113C	C18700	-	-	-/-	•	•	↗	↗	↓	85
M10	CuZn10	CW501L	C22000	C2200	•	•/•	•	•	↑	↓	↗	43
M15	CuZn15	CW502L	C23000	C2300	•	•/•	•	•	↑	↓	↗	36
M30	CuZn30	CW505L	C26000	C2600	•	•/•	•	•	↑	↓	↗	28
M33	CuZn33	CW506L	C26800	C2680	•	-/-	-	-	↑	↓	↗	26
M36	CuZn36	CW507L	C27000	C2700	•	-/-	-	-	↑	→	↗	26
M37/M38	CuZn37	CW508L	C27200	C2720	•	•/•	•	•	↑	→	↗	26
Z10	CuZn37Pb0,5	CW604N	C33500	-	-	•/•	•	•	↗	↗	→	25
Z11	CuZn35Pb1	CW600N	C34000	C3501	-	•/•	•	•	↗	↗	→	25
Z12	CuZn35Pb2	CW601N	C34200	C3560	-	-/-	•	•	↗	↗	→	25
Z14	CuZn37Pb2	CW606N	C35300	C3601	-	-/-	•	•	→	↑	→	24
Z21	CuZn38Pb2	CW608N	C35000	C3771	•	•/•	•	•	→	↑	→	24
Z23	CuZn36Pb3	CW603N	C36000	C3601	-	•/•	•	•	→	↑	→	22
Z29	CuZn39Pb2	CW612N	C37700	C3771	-	•/-	•	•	↓	↑	→	24
Z31	CuZn40Pb2	CW617N	C38000	C3771	-	•/-	•	•	↓	↑	→	25
Z32/Z33	CuZn39Pb3	CW614N	C38500	C3603	-	•/-	•	•	↓	↑	→	25
ECOBRESS	CuZn21Si3*	-	C69300	C6932	-	•/-	•	•	↗	↗	↗	8
B03/B14	CuSn4	CW450K	C51100	C5111	•	-/-	•	•	↑	↓	↗	20
B05/B15	CuSn5	CW451K	C51000	C5102	•	•/•	•	•	↑	↓	↗	17
B06/B16	CuSn6	CW452K	C51900	C5191	•	•/•	•	•	↑	↓	↗	16
B09/B18	CuSn8	CW453K	C52100	C5212	•	•/•	•	•		↓	↗	11
B44	CuSn4Pb4Zn4	CW456K	C54400	-	-	-/-	•	-	↗	↗	→	19
* not specified in EN									↑ excellent			
									↗ good			
									→ fair			
Further alloys are available upon request. Please contact us.									↓ poor			

**Wieland**

WIELAND-WERKE AG  
[www.wieland.com](http://www.wieland.com)

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Drawn Products Division

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