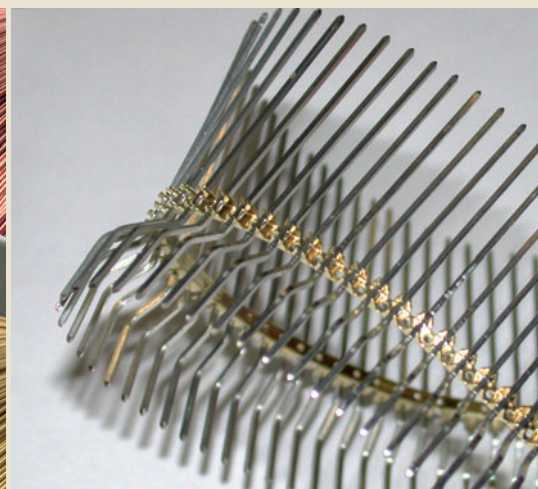
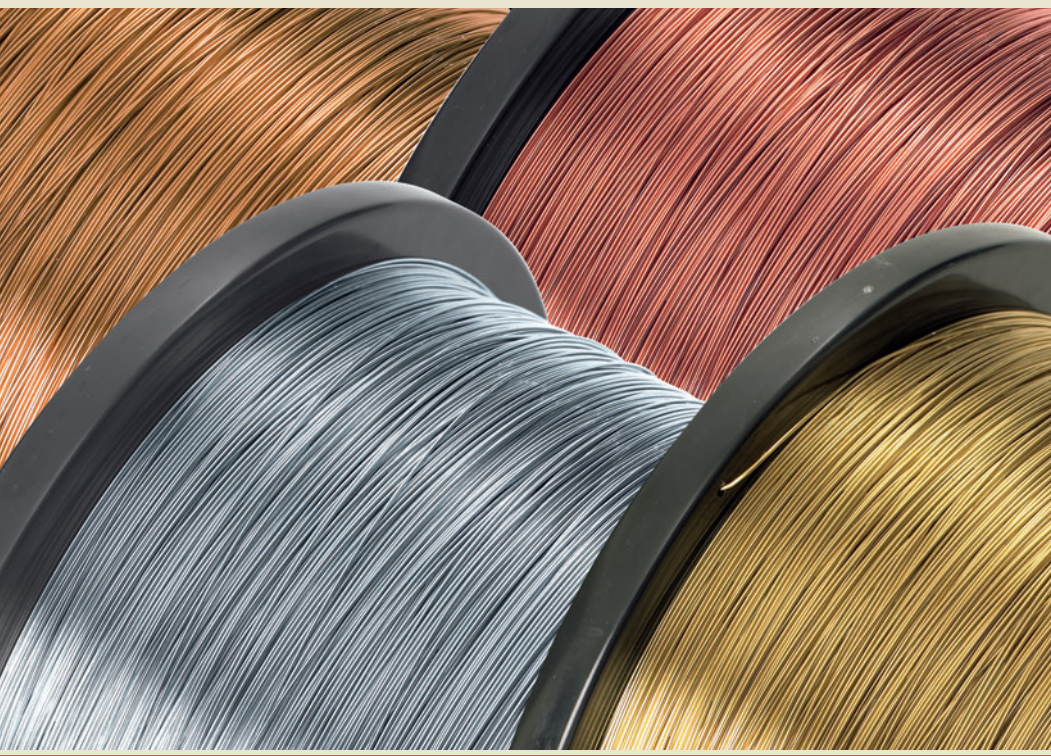


Wieland

**High-performance
copper-alloy wire**



High-performance copper-alloy wire

Company portrait

The Wieland Group with headquarters in Ulm, Germany, is one of the world's leading manufacturers of semi-finished and special products in copper and copper alloys. These include strip, sheet, tube, rod, wire and sections as well as slide bearings, finned tubes and heat exchangers.

Wieland's history dates back to the early 19th century. Founder Philipp Jakob Wieland took over his uncle's Ulm art and bell foundry in 1820 and by 1828 he was producing brass sheet and wire.

Today, the Wieland Group comprises manufacturing companies, slitting centres, trading subsidiaries and sales offices in many European countries as well as in the USA, in South Africa, Singapore and the People's Republic of China.

Wieland manufactures several hundred thousand tons of copper alloys every year, from continuous cast to semi-finished product. The starting point for the production is our plant in Vöhringen, Germany, Europe's largest foundry for copper alloys.

Copper

Copper is one of the oldest materials and today amongst the most widely used non-ferrous metals. Wieland semi-finished products form an indispensable link between the raw material copper and the products made by our customers.

Copper-based materials are suitable for a wide range of applications due to the unique combination of various properties such as

- high electrical and thermal conductivity
- outstanding corrosion resistance
- good forming and processing properties
- excellent suitability for surface coating

Therefore, Wieland semi-finished products are used across most industries.



High-performance copper-alloy wire

Electrical and electronic applications sometimes require material properties which are counteracting, e.g. electrical conductivity and mechanical strength. The Wieland alloy variety enables the customer to choose the optimum combination.

Wire in diameters between 0.3 and 4.5 mm is available in the following copper materials:

- high copper alloys
- bronze
- brass
- nickel silver

High strength and high conductivity through precipitation-hardened alloys

Special high copper alloys can be optimised through a heat treatment. The alloying elements which are finely distributed as precipitations result in a better property combination of:

- high strength
- good formability
- high conductivity
- stress relaxation resistance
- fatigue resistance

These precipitation-hardened alloys are:

- Wieland K55: CuNi3SiMg
- Wieland K65: CuFe2P
- Wieland K80: CuFeP
- Wieland K88: CuCrAgFeTiSi

Material designation		
Wieland	EN	UNS
K81	CuSn0.15	C14415
KB9	CuSn0.3	C14425
K55	CuNi3SiMg	C70250
K65	CuFe2P	C19400
K80	CuFeP	C19210
K88	CuCrAgFeTiSi	C18080
KY6	CuMg0.1	C15500
B14	CuSn4	C51100
B15	CuSn5	C51000
B16	CuSn6	C51900
B18	CuSn8	C52100
M15	CuZn15	C23000
M20	CuZn20	C24000
M30	CuZn30	C26000
M36	CuZn36	C27000
M38	CuZn38	C27400
N22	CuNi12Zn24	C75700
N29	CuNi18Zn20	C76400

Requirements of EN 2083 regarding copper alloys for stranded wire

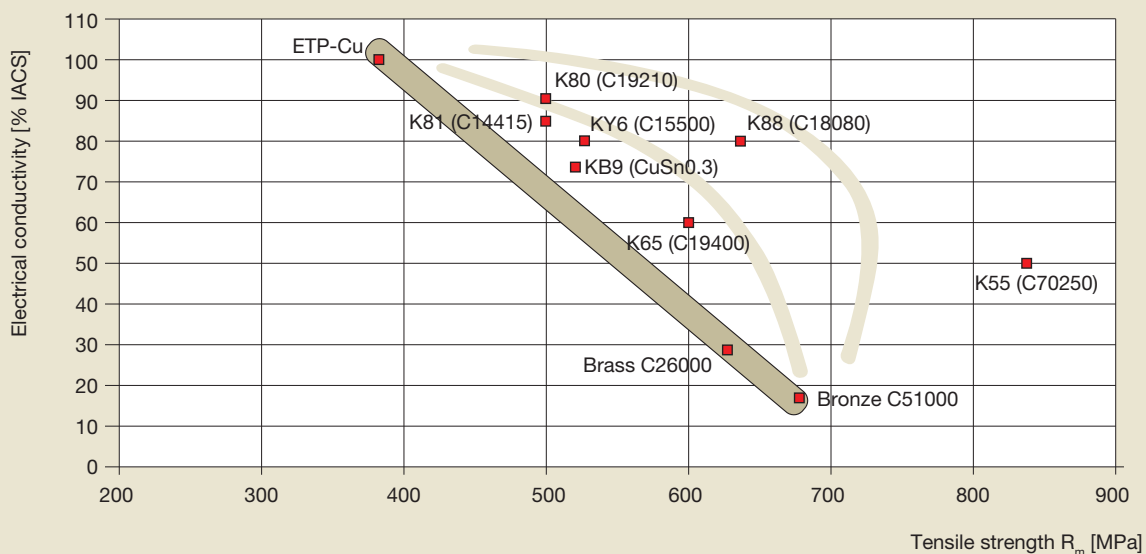
Mechanical properties:

$$R_m \geq 350 \text{ MPa}$$

$$A_{100} \geq 6 \%$$

Electrical conductivity:

$$\geq 70 \% \text{ IACS}$$



Applications

Electromechanical components

Bronze and brass are well-established materials for connectors. Over the years high copper alloys have been gaining in importance. Their high conductivity reduces heating from current conduction and their high strength and resistance to stress relaxation increase mechanical stability, in particular vibration resistance.

For 0.63 x 0.63 mm pins Wieland K55 and K65 have proved successful in the automotive industry.

Other electromechanical components such as coil springs are increasingly being made of high copper alloys.

Stranded wire resistant to fatigue

High copper alloys are used for conductor wire whenever high mechanical strength, especially fatigue strength is required.

Wieland's precipitation-hardened copper alloys are a good alternative to the cadmium-containing materials which have been used so far and no longer conform to RoHS.

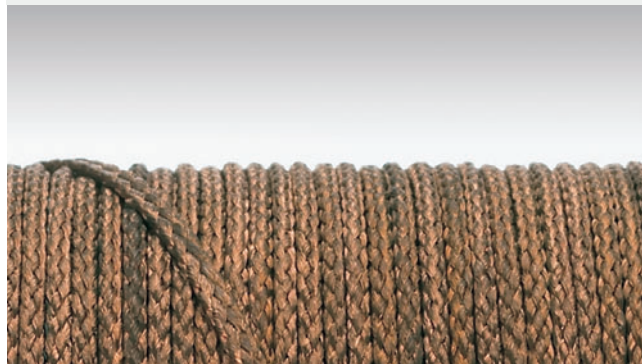
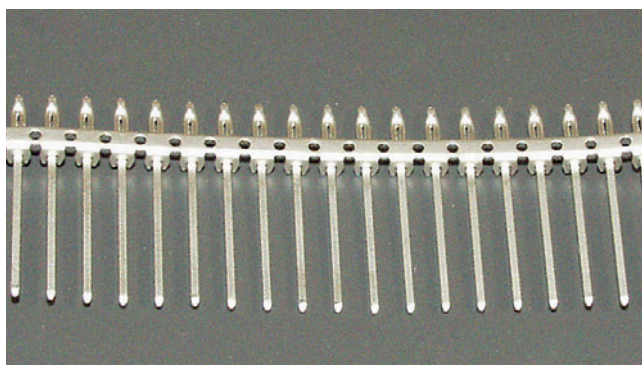
Wieland K80 and K88 meet the requirements of EN 2083 regarding strength and strain. With min. 80 % IACS they clearly exceed the specified electrical conductivity.

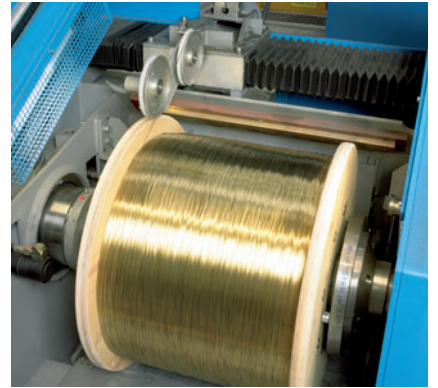
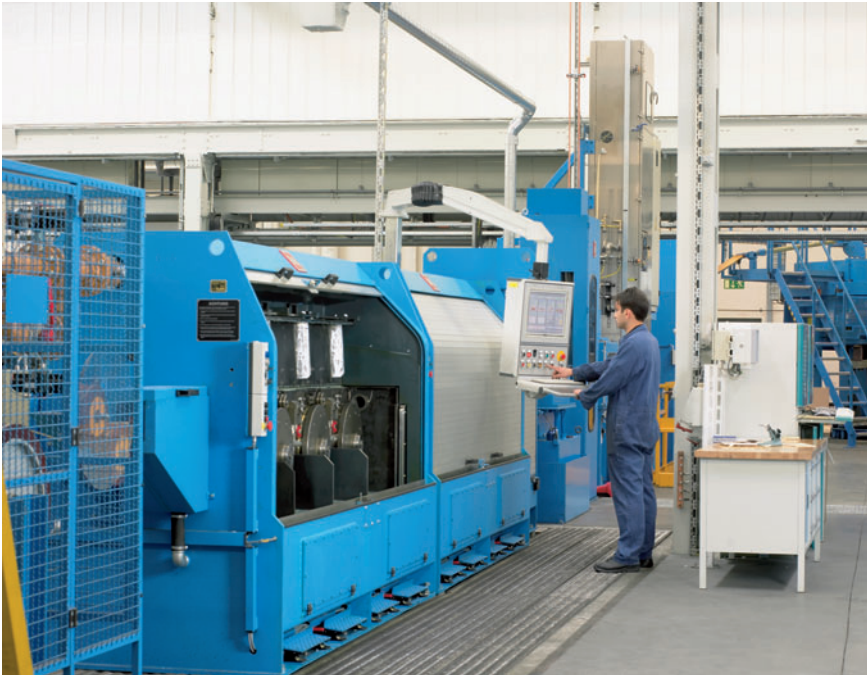
High-strength magnet wire

High copper alloys are also gaining in importance for the manufacture of enamelled wire in electric motors: Conductivity and strength enable the use of high currents and provide good resistance to vibration.

Cold-forged components

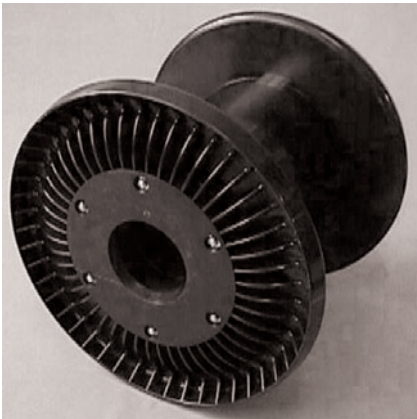
Anode pins, screws, metallic sealing rings and ballpen tips are frequently manufactured by cold forging for which the homogeneous and fine-grained structure of Wieland materials has proved successful. The materials used are bronze, brass, nickel silver and high copper alloys, for example Wieland K81.



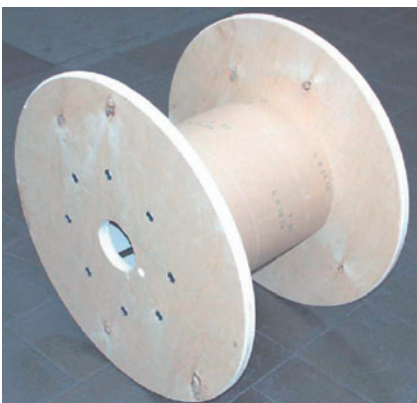


The new wire drawing equipment at Wieland was installed in 2004. With modern machine technology, high-performance lubricants, drawing speeds of more than 1000 m/min and in-line heat treatment furnaces the wire is drawn to diameters of minimum 0.3 mm.

Dimensions
Ø 0.3 mm to 4.5 mm
Ø 0.012 inch to 0.18 inch
on request up to 14 mm/0.55 inch



According to customer requirements the wire is delivered on plastic, wooden or steel reels carrying 50 to 1000 kg, in bunched coils, on stems and in cardboard drums.



WIELAND-WERKE AG www.wieland.com

Extruded and Drawn Products Division

Graf-Arco-Str. 36, 89079 Ulm, Germany, Phone +49 (0)731 944-0, Fax +49 (0)731 944-2772, info@wieland.de

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