Wieland

ECOBRASS®

The lead-free machining brass

Company profile

The Wieland Group, with headquarters in the southern German city of Ulm, is one of the world's leading manufacturers of semi-finished and special products in copper and copper alloys: strip, sheet, tube, rod, wire and sections as well as slide bearings, finned tubes, heat exchangers and ready-to-assemble components.

Wieland's roots go back almost 200 years. Its founder, Philipp Jakob Wieland, took over his uncle's fine art and bell foundry in Ulm in 1820, and by 1828 he was already fabricating sheet and wire from brass.

Today, the Wieland Group comprises manufacturing companies, slitting centres and trading companies in many European countries as well as in the USA, South Africa, Singapore, India and China. Wieland's output reaches approx. 500,000 tons a year in copper alloy products, from continuous cast products to ready-to-assemble components.

The starting point of the production process is Europe's largest foundry for copper alloys at Wieland's Vöhringen location.

Through systematic investment in our facilities as well as ongoing research and development we are continuously striving to improve the products for our customers.

Legal framework

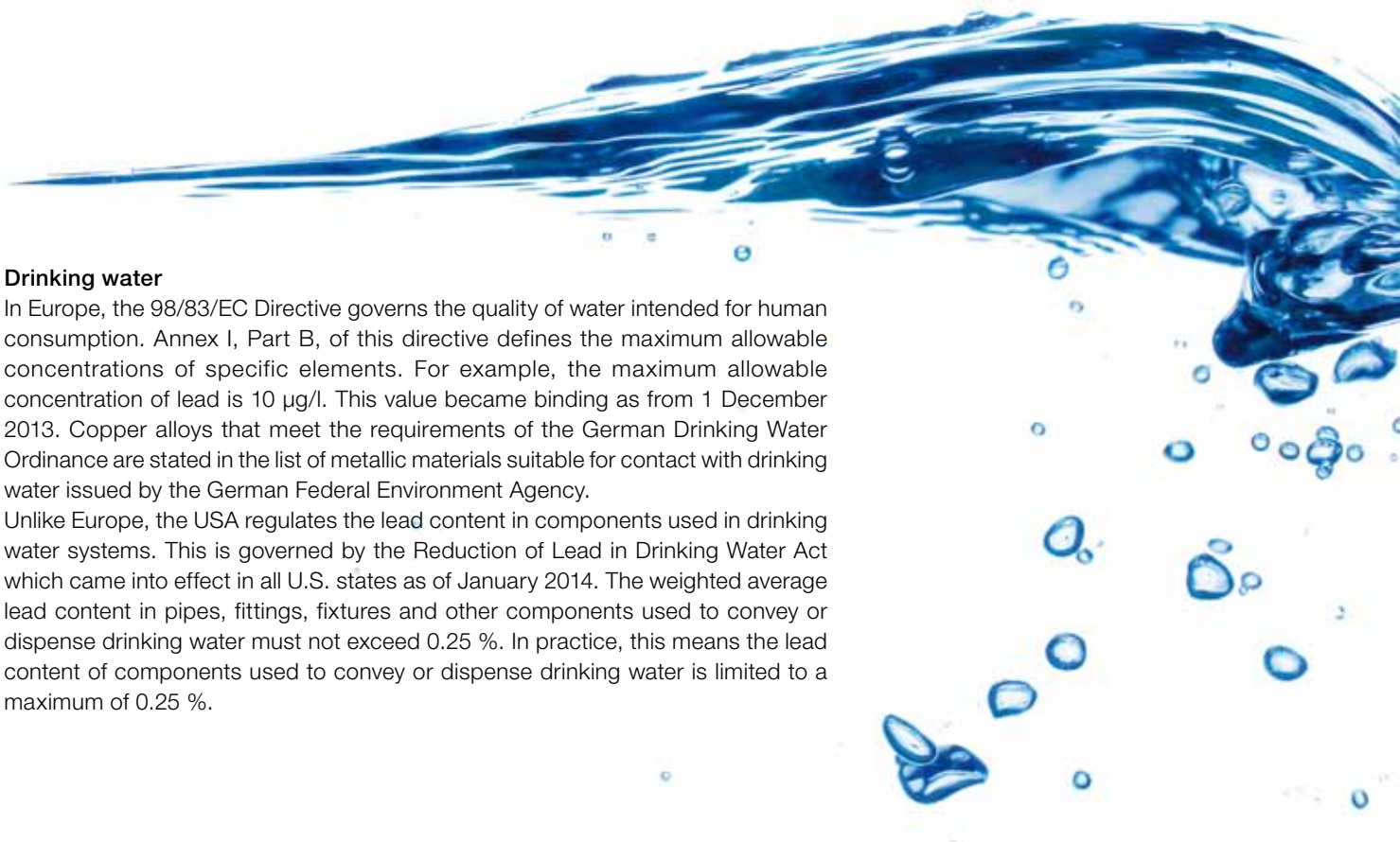
ECOBRASS has been specially developed to meet the latest legal and hygienic requirements worldwide.

RoHS

The European Restriction of Hazardous Substances Directive 2002/95/EC, (RoHS), short for Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment, regulates the use of hazardous substances in electrical and electronic equipment. For lead a limit value of max. 0.1 % is specified. Copper alloys are currently exempt with a current maximum permissible lead content of 4 %. Comparable directives are implemented worldwide. For example, the “China RoHS” took effect on 1 March 2007 and the “Korea RoHS” on 27 April 2007. The contents of both directives are largely taken from the European RoHS, ELV and WEEE directives. In countries like Japan and the USA, similar directives are under discussion, implementation or have already been implemented.

ELV

The 2000/53/EC Directive of the European Parliament and of the Council of 18 September 2000 on end-of-life vehicles regulates the recycling of motor vehicles in the European Union. It contains bans on substances such as heavy metals and was transposed into the German end-of-life vehicles regulation on 1 July 2002. Here, too, the limit value for lead of max. 0.1 % applies. Copper alloys are also exempt with a maximum permissible lead content of 4 %. The directive and consequently the exemption are reviewed on a regular basis.



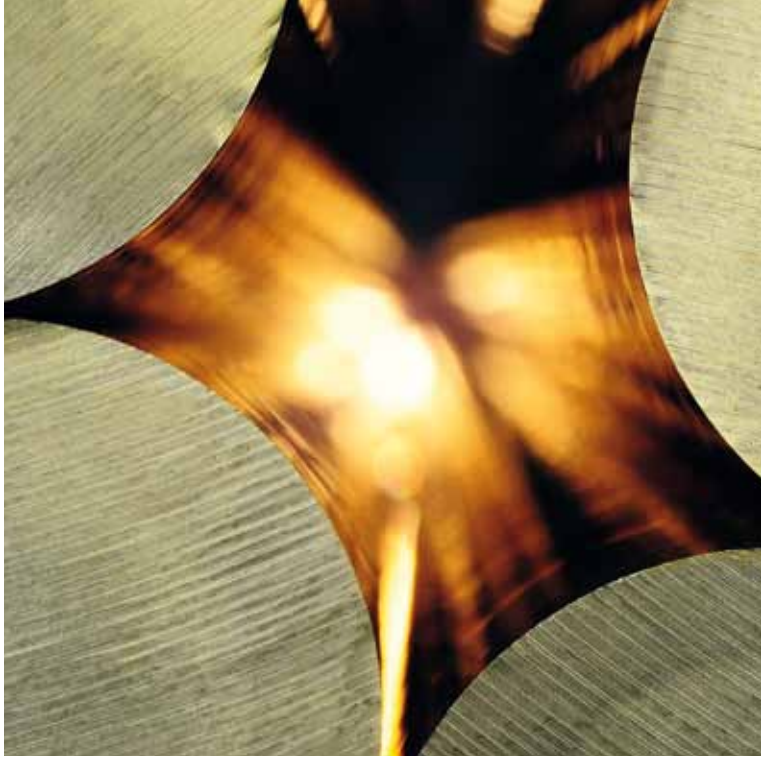
Drinking water

In Europe, the 98/83/EC Directive governs the quality of water intended for human consumption. Annex I, Part B, of this directive defines the maximum allowable concentrations of specific elements. For example, the maximum allowable concentration of lead is 10 µg/l. This value became binding as from 1 December 2013. Copper alloys that meet the requirements of the German Drinking Water Ordinance are stated in the list of metallic materials suitable for contact with drinking water issued by the German Federal Environment Agency.

Unlike Europe, the USA regulates the lead content in components used in drinking water systems. This is governed by the Reduction of Lead in Drinking Water Act which came into effect in all U.S. states as of January 2014. The weighted average lead content in pipes, fittings, fixtures and other components used to convey or dispense drinking water must not exceed 0.25 %. In practice, this means the lead content of components used to convey or dispense drinking water is limited to a maximum of 0.25 %.

ECOBRASS®

Wieland saw the trend towards environmentally friendly, lead-free alloys at a very early stage and therefore has taken the lead in Europe by launching ECOBRASS. This approach has proven to be far-sighted. Today, ECOBRASS is available through a cooperation network worldwide and supplied by trading companies also in small purchase quantities. In the meantime, this material is standardised – in Europe in EN 12163 – 12168 under the designation CW724R or CuZn21Si3P, in the USA under C69300.



– lead-free – machinable – forgeable –
– cold workable – corrosion-resistant –
– high strength – recyclable – available –

Material properties

ECOBRASS contains no toxic additives such as lead and nickel. ECOBRASS shows excellent processing behaviour in machining, forging and cold forming. It has mechanical strength characteristics that fully match some steel grades and its corrosion resistance is significantly superior to that of conventional free-cutting brass.

Chemical composition (nominal, percentage by mass)	
Cu	76 %
Si	3 %
P	0.05 %
Zn	balance
Pb	< 0.09 %

Processing behaviour	**ECOBRASS**
Machinability (CuZn39Pb3 = 100 %)	80 %
Cold forming properties	good
Hot working properties	very good
Joining processes:	
Resistance welding	good
Gas shielded arc welding	good
Brazing	good
Soft soldering	good
Surface treatment:	
Polishing	good
Electroplating	good

Rm tensile strength	> 600 MPa
Rp 0.2 %-yield strength	> 300 MPa
A5 elongation at fracture	> 12 %

(Typical reference values for 20 – 40 mm round rods in R600 temper according to DIN EN 12164)

Density	8.3 g/cm³
Electrical conductivity	4.5 MS/m
Thermal conductivity	approx. 35 W/mK
Modulus of elasticity	100 GPa

(Reference values)

Machining

Despite the absence of lead, ECOBRASS possesses excellent machining properties. Silicon-rich phases in the microstructure act as chip breakers. They are “hard” chip breakers compared to lead. The resulting chips are particularly short. The roughness depth is less than that of conventional free-cutting brass. Compared to CuZn39Pb3, slightly higher tool wear is to be expected, with standard brass tools being generally suitable for ECOBRASS. However, for further process optimisation, tests should be done to determine better suited material types and geometries. As a first approximation, the following parameters, compared with CuZn39Pb3, are recommended:

- The tools used should preferably be coated carbide or PCD tools with a slightly negative chip angle. Chip-breaking geometries lead to additional improvements, with the wiper geometry being particularly recommended.

- In outside machining, slightly higher cutting speeds and feeds (by up to 40 %), as compared to lead-containing brass, result in better chip breaking. Unlike outside machining, inside machining should be done with a slightly lower cutting speed (by approx. 20 %). Moreover, facilitating the removal of chips prevents the risk of jamming.

- In drilling operations, inner cooling helps to remove the chips. Threads can be perfectly cut using mean cutting speeds and untwisted HSS tools.

Casting

For mould- and sand casting components, ECOBRASS has been further developed and is available in an optimised composition under the ECOCAST brand in the form of ingots.

/// ECOCAST®

By adding a grain refiner, grain sizes of 20 – 30 µm can be achieved on the cast parts. Moreover, ECOCAST has outstanding flow and mould-filling properties. With the consistently positive basic properties of ECOBRASS this customised alloy is ideally suited for casting applications.

Forging

Given a higher forming temperature and adequate soaking time, the flow behaviour achievable with ECOBRASS is comparable with forging brasses CuZn40Pb2. The recommended forging temperature is between 750 and 800 °C. For optimum results, it should be noted that the temperature range is narrower than for conventional forging brass.
For operations with temperatures > 600 °C we recommend a thermal treatment at 550 – 580 °C for 2 – 3 hours.

Cold forming

ECOBRASS lends itself well to cold forming. Despite its high mechanical strength, it still shows adequate elongation. The material is very well suited to a combination of machining and cold forming, e.g. bending, riveting, crimping or knurling.

Mechanical properties

The mechanical characteristics of ECOBRASS are exceptionally high for a brass material. The high tensile strength combined with high elongation at fracture are otherwise only found in certain steel grades.

Sustainability

Recycling is the raw-material concept of the future. As with all copper materials, ECOBRASS is processed within a full-cycle materials reclamation system, thus not only saving raw material resources but also energy. Compared to steel, ECOBRASS offers not only the benefit of heightened productivity but, in addition, significant cost-cutting potential in the form of revenues from ECOBRASS chips.

Corrosion behaviour

ECOBRASS owes its excellent corrosion resistance to targeted alloying. The addition of silicon and phosphorus raises tarnish-resistance and reduces susceptibility to dezincification and stress corrosion cracking. The dezincification resistance of ECOBRASS, tested to ISO 6509, is clearly below the limit values specified by the product standards EN 12163 – 12168. Under the stress corrosion cracking test according to DIN 50916, Part 1, even components without additional heat treatment show no defects.

Availability and reliability

Through a Europe-wide network of trading partners, Wieland offers ECOBRASS market- and customer-oriented. Our products are available ex works and also via a large number of trading companies stocking ECOBRASS in dimensions common in the trade.

Our long-term contracts with pre-material suppliers enable us to ensure continuous supply to our customers.

Available product forms and dimensions

ECOBRASS is available in the form of rods, wires, sections and tubes.

ECOCAST can be supplied in the form of small ingots.

Technical service

Our Technical Marketing experts are available to discuss any aspect of your production from the planning stage in order to find the optimum solution in partnership with you. Their know-how and expertise allow them to provide you with detailed information about product properties, further processing and delivery options.

Quality management

We have been certified under DIN ISO 9002 and BS 5750 pt2 since 1987 and under ISO 9001:2008 since 2000.

Research and development

Ongoing research and development is the foundation on which high-quality, future-oriented products are created within the Wieland Group. The objective of the development work, over and above high quality, is to provide customers with innovative products which allow cost-effective manufacture hand in hand with the efficient use of resources. Another aspect of Wieland's R&D activities is the development of materials which conform to current environment and health requirements.

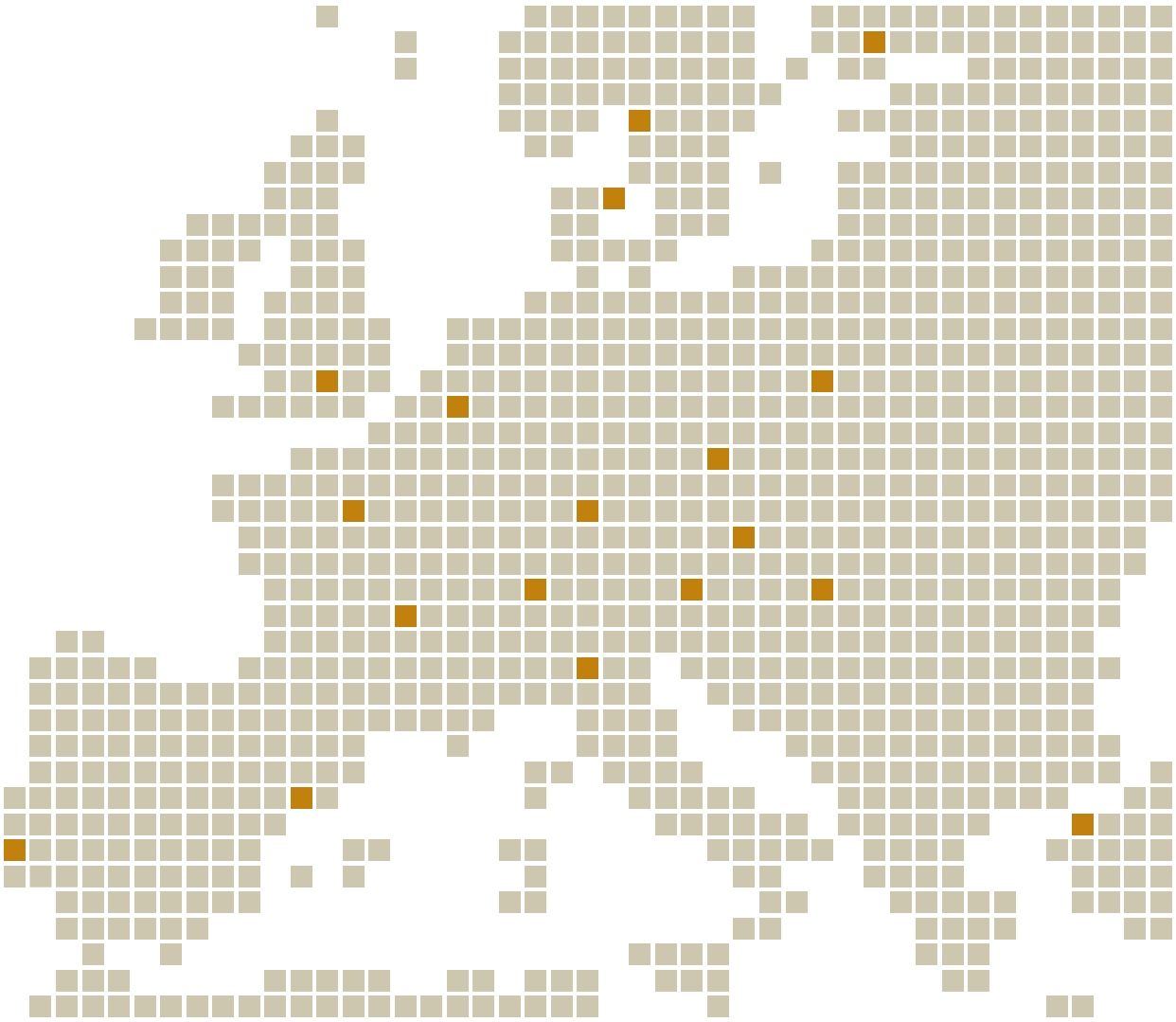
A stringent, comprehensive control system ensures constant and consistent product quality. Another way in which Wieland satisfies ever-rising quality demands is by developing and building high-precision measuring and testing equipment.

Moreover, Wieland is the only company in the industry with a testing and certification laboratory accredited to DIN EN ISO/IEC 17025 (2005).

Manufacturer identification

The ends of all ECOBRASS rods (> Ø 6 mm) are marked ex works, as shown below, which enables you to clearly identify the high-quality brand from Wieland.

ECOBRASS – availability throughout Europe



Further information can be found at:

www.wieland.com

Your partner:

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