

wieland

Clear solutions for
clean drinking water





Copper alloys for drinking water applications

Drinking water is our most important nutrient. The quality of the drinking water has to be such that lifelong consumption is possible without restrictions. Therefore, the materials which are in contact with drinking water have to meet increasingly stringent requirements worldwide. The choice of suitable materials and products for drinking water applications is essential, with technical, economic and particularly hygienic and health aspects playing a key role.

Copper alloys have proven their worth worldwide billions of times, both technically and hygienically, and therefore continue to be the basis for clean drinking water.

Legislative framework

Aspects of hygiene and health have caused legislators world-wide to limit the maximum allowable concentrations of substances in drinking water, thus following the recommendations of the WHO. In Europe and the USA, the relevant requirements were changed accordingly at the end of 2013 and the beginning of 2014 respectively. However, both regions follow clearly different approaches.

Drinking Water Directive

In Europe, the Directive 98/83/EC 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,

In drinking water installations, it therefore has to be ensured that only materials are used that are suitable for contact with drinking water. Materials that are hygienically approved for drinking water installations in Germany are stated in the list of metallic materials suitable for contact with drinking water issued by the German Federal Environment Agency. Based on the 4MS Initiative, supported by Germany, France, the Netherlands, Denmark and the United Kingdom, there will henceforth be a common Composition List for metallic materials in line with the German Federal

Environment Agency's of metallic materials suitable for contact with drinking water. Other EU countries have already indicated that they too will adopt this common Composition List.

On 16 December 2020, a new version of the European Drinking Water Directive was published, which came into force on 12 January 2021 and must be transposed into national law by 12 January 2023. The new version states that a limit value for lead of 5 µg/l must be complied with at the latest after the transitional period of 15 years from 12 January 2036.

Safe Drinking Water Act

In the USA, the Safe Drinking Water Act governs the quality of drinking water, with the focus being on specific elements used in drinking water systems. 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 %

Lead-free copper alloys

Lead-free copper alloys have a lead content of less than 0.1 % and therefore continue to meet all hygiene requirements worldwide. 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.

ECOBASS is particularly suitable for the use in components for drinking water systems. The special brass is characterised by a combination of excellent processing properties and high corrosion resistance.

ECOBASS is our premium alloy and is available in both machining- and hot-stamping quality.

Low-lead copper alloys

Low-lead alloys with a lead content of less than 0.25 % have been specially developed for sanitary components in the US market but can of course be used in Europe as well.

In addition to machining- and hot-stamping brass, the range of alloys also includes dezincification-resistant brass. The chemical composition has been considerably tightened compared to the standard specification in order to facilitate the processing properties of the material.

Lead-containing copper alloys

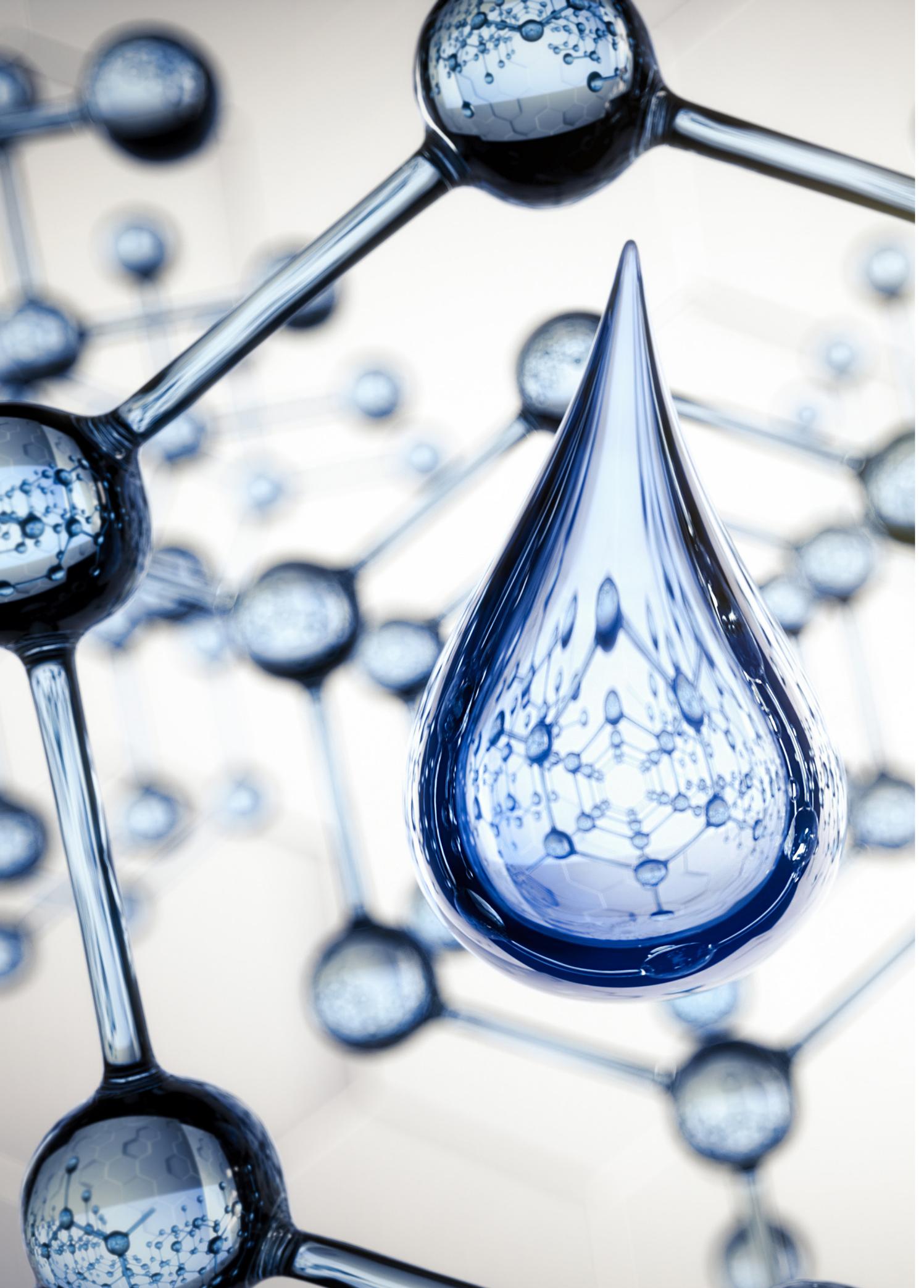
Lead-containing copper alloys have for decades proven their worth both hygienically and technically. However, with a lead content of more than 0.25 % they will no longer be permitted in the U.S. market as of 2014.

In Europe the dezincification-resistant brass CuZn36Pb2AS (CW602N/UNS C35330) has not been included in the hygienic list.

Lead-containing brass meets very high requirements in terms of processing properties and productivity. Our proven lead-containing copper alloys for drinking water applications have been complemented by an easily machinable, dezincification-resistant brass that meets the requirements of the EU Drinking Water Directive in terms of lead migration, with red brass rounding off our unique range of materials for drinking water applications.







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Material ¹	Lead-free		Low-lead		Lead-containing		
ISO	CuZn21Si3P	CuSn4Zn2PS-C-GC	CuZn42	CuZn38As	CuZn40Pb2	CuZn33Pb1AlSiAs	CuSn5Zn5Pb2-C-CG
EN	CW724R		CW510L	CW511L	CW617N	CW725R	CC499K
UNS	C69305 C69300			C27450	C38000		
	ecobrass SW4 eco SW1	eco GS1	eco M57	eco M41	Z41/Z48	Z43	GD1
Processing properties							
Machinability [%] (CuZn39Pb3: 100 %)	80	70	70	50	95	75	70
Cold forming properties	good	not possible	poor	good	poor	good	not possible
Hot forming properties	very good	not possible	very good	fair	very good	good	not possible
Mechanical properties (reference values)							
Tensile strength R _m [MPa]	500 - 700	250	500	400	500	400	275
Yield strength R _{p0.2} [MPa]	300 - 400	110	330	250	400	330	130
Hardness HB	130 - 200	65	150	110	140	120	85
Elongation [%]	25	13	25	30	20	25	35
Corrosion resistance							
Stress corrosion resistance	yes	yes	yes, with special measures	yes			
Dezincification resistance ²	yes	yes	no	yes	no	yes	yes
Recycling							
Separate scrap cycle	yes	yes	no ³	no ³	no	yes	yes
Hygienic approval							
Region	Europe and USA	Europe and USA	Europe and USA	Europe and USA	Europe	Europe	Europe

¹ There are stricter specifications in place at Wieland for the use in drinking-water components for a number of elements compared to the respective product standards

² Dezincification test according to ISO 6509 and the relevant product standards

³ From an economic point of view, a separate scrap cycle makes sense

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