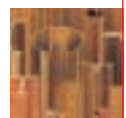
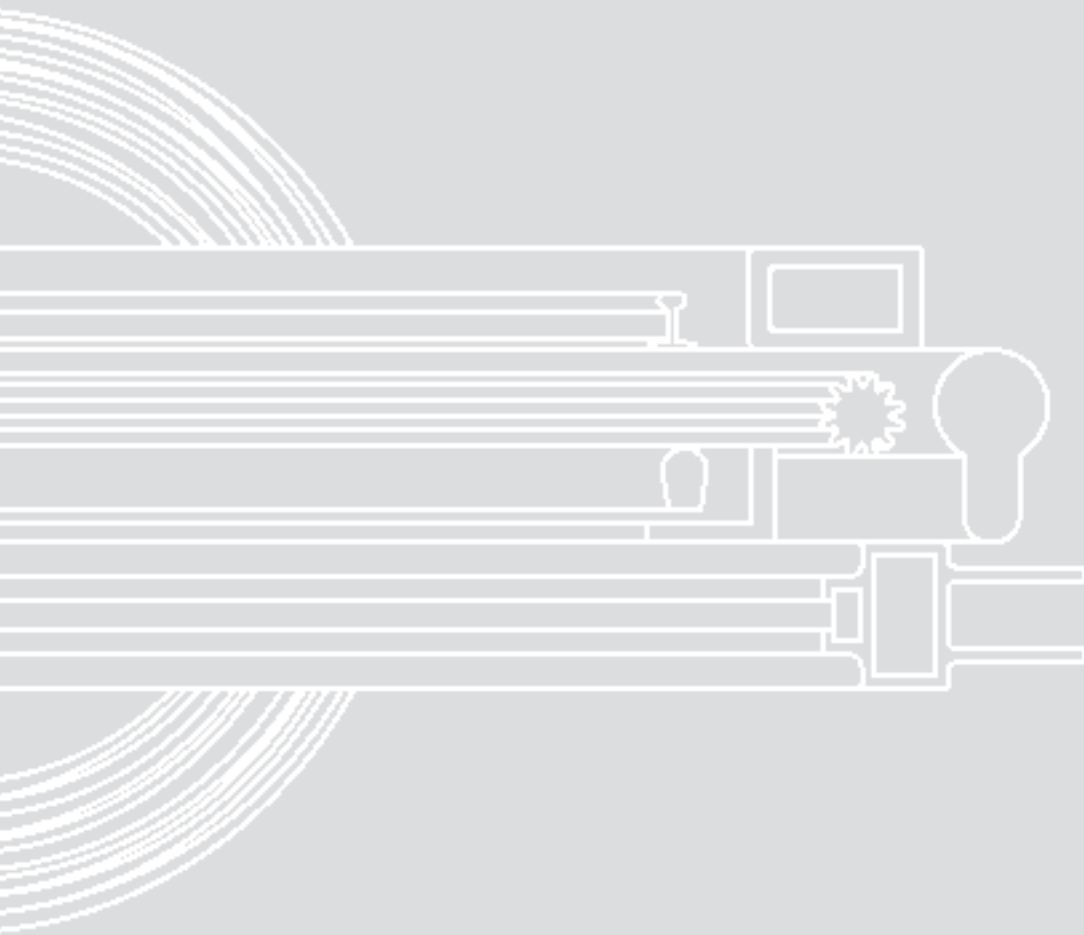
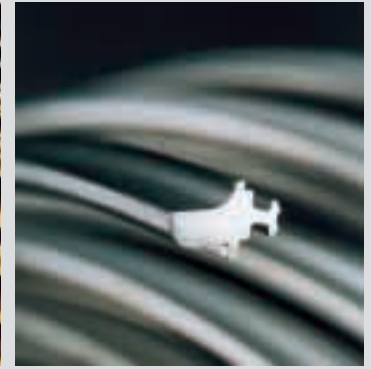
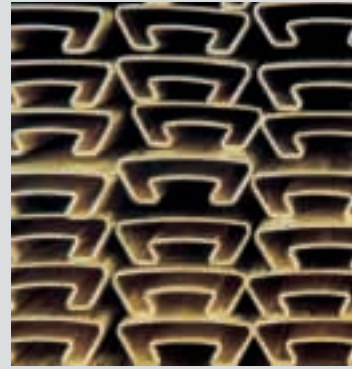


# Wieland



***Sections, sectional wire, tubes and sectional tubes***







Copper is the oldest metal in use and is one of the most frequently employed metals. Semi-finished products are the indispensable link between the raw material and the finished products.

Wieland-Werke AG is one of the world's leading producers of semi-finished products made from copper and copper alloys. With plants in Ulm and Vöhringen, subsidiaries in Villingen, Langenberg, Birmingham (England), Chicago (USA), Singapore, Enzesfeld and Amstetten (Austria) and at further sites throughout the world, the Wieland group currently employs around 5800 staff.

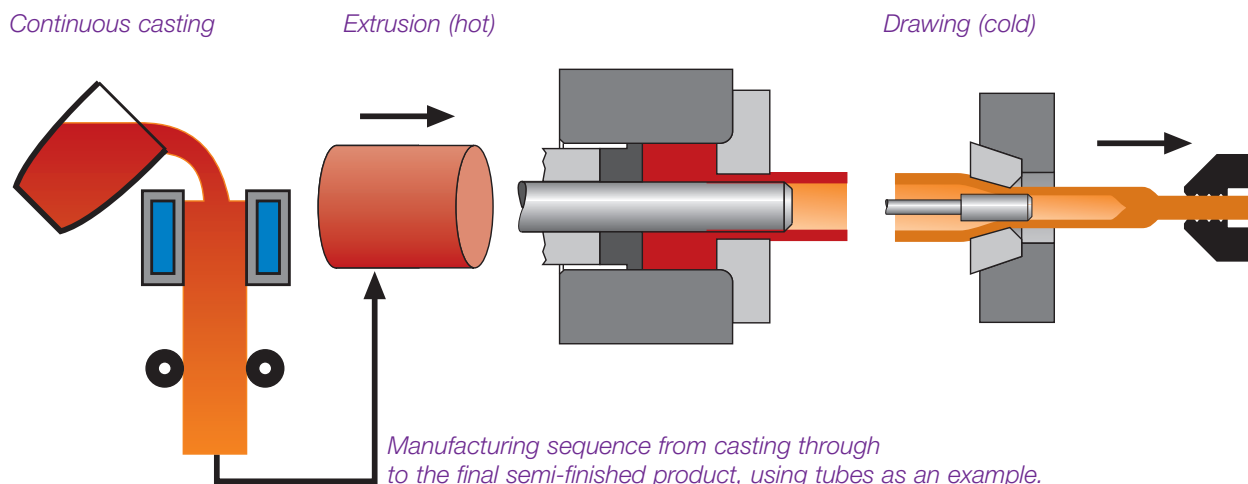
The image of the company, founded in 1820, is defined by state-of-the-art production facilities and know-how with a strong emphasis on quality, customer relations and trust.

Wieland semi-finished products are used as components or functional parts throughout the metal-processing industry – from the electrical engineering sector through mechanical engineering to microelectronics.

Our standard range of semi-finished products is complemented by sections, sectional wire, tubes and sectional tubes with properties adapted to the specific requirements for further processing.







### Casting

Wieland melts and casts more than 100 different copper alloys into different formats for further processing.

Each batch is strictly checked before casting, resulting in excess of 1200 analyses per day. Only if the composition is exactly right casting will be allowed to commence.

Wieland has a number of fully continuous and semi-continuous casting lines which are used to produce the pre-material for all extruded and drawn products.



### Extrusion

The cast strand is sawn into billets and subsequently extruded at high temperatures on extrusion presses into sections, sectional wire or tubes.

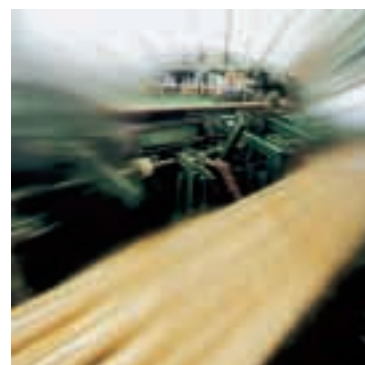


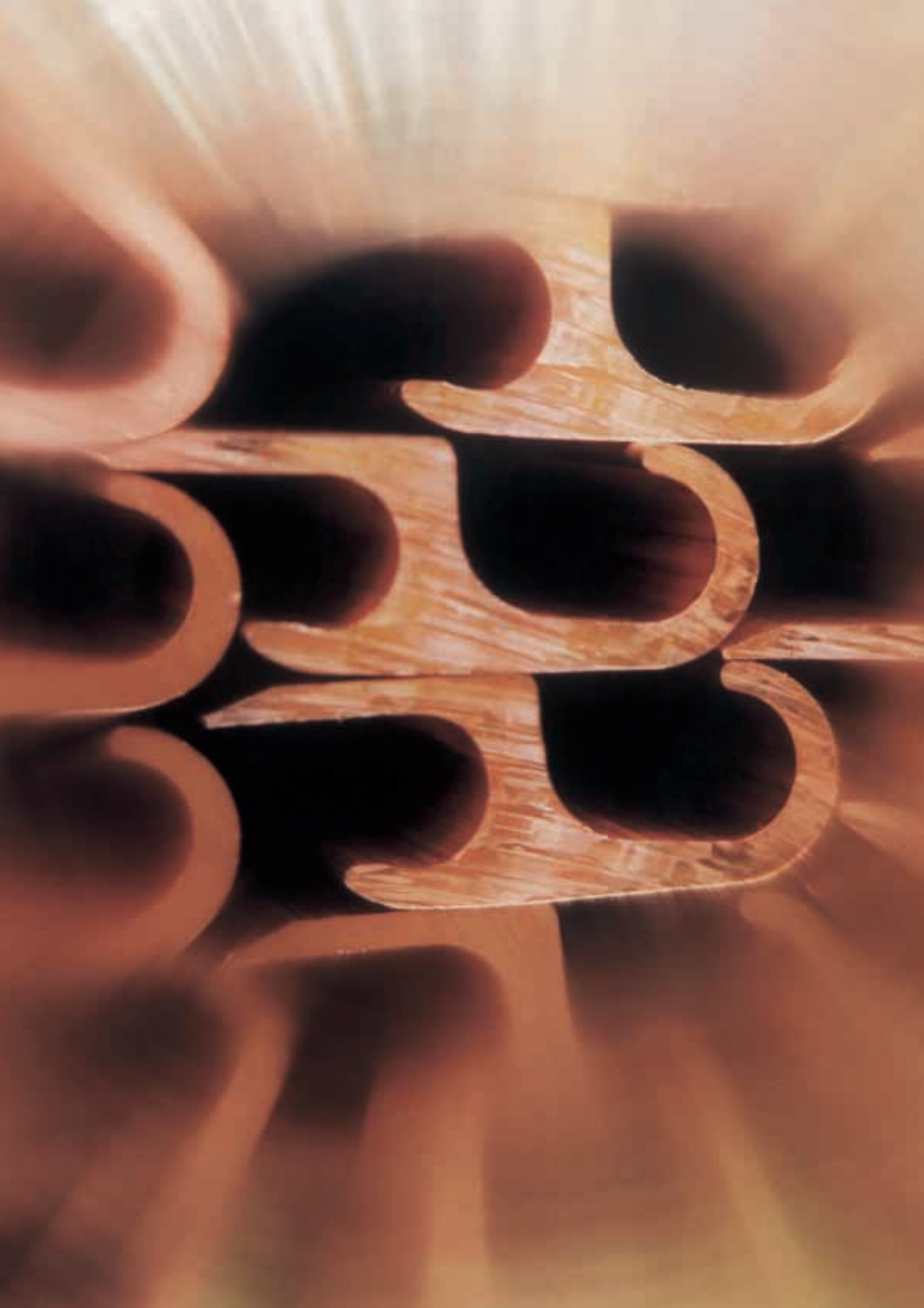
### Drawing

The shells which have been extruded at high temperatures in some cases represent the finished product. Where there are higher demands on mechanical characteristics, tolerances and surface quality, additional cold forming operations are necessary. Intermediate annealing operations achieve the desired change in microstructure.

### Quality assurance

In addition to tests which take place during production, extruded and drawn products are subjected to final inspection and compared with the customer's quality specification. Only faultless material is processed further and dispatched.











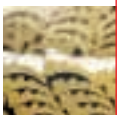
**Copper** **Zinc**

**Trends of various brass properties depending on the zinc and lead content**

**Hints for selecting materials**

Materials	Wieland abbreviations	Properties	Applications (examples)
Copper and low copper content alloys	<b>K..</b>	High electrical and thermal conductivity, good corrosion resistance, excellent cold forming properties Fe- and Cr-containing alloys with good mechanical characteristics	Bus bars Electrical connectors Welding electrodes Electrical plug pins
Copper-zinc alloys containing minimum 63% copper – Brass	<b>M..</b>	compared to pure copper, higher strength, excellent cold forming properties »gold colour«	Components formed by bending Plumbing accessories
Copper-zinc alloys containing lead and less than 63% copper – Free-cutting brass	<b>Z..</b>	strength and hot forming properties increase with higher zinc content. Lead assists machinability	Turned and milled parts for electrical engineering, the plumbing industry and mechanical engineering Hot-stamped parts
Copper-zinc-X alloys – Special brass	<b>S..</b>	trace elements such as Mn, Fe, Al, Si, Ni improve strength and corrosion resistance	Construction elements exposed to wear Slide bearings
Copper-nickel-zinc alloys – Nickel silver	<b>N..</b>	bright silver colour, good resistance to corrosion and tarnishing good cold forming properties leaded nickel silver – excellent machinability	Optical parts Writing instruments Precision mechanics
Copper-tin alloys – Phosphorous bronze	<b>B..</b>	Sn and P provide good strength values and spring properties excellent cold forming properties	Construction components Spring elements Slide bearings

Material data sheets giving detailed information about material properties are available on request.





**Sections, sectional wire**

There is an increasing trend towards sections as pre-material, with a view to achieving a more economical production. Further developments in materials as well as advanced production processes and tool design enable us to manufacture even more complicated shapes. In many instances the finished part can simply be produced by cutting the appropriate length from a section or profiled wire.

The effective use of sections results in less costly production methods and can enhance the quality. Shape and dimensions of the profile cross section are usually defined in a drawing.

Sections can be supplied as solids or hollows either "extruded" or "drawn" where tighter tolerances and specific mechanical characteristics are required.

Fundamentals of the production feasibility of sections and its process limits are defined in DIN 17674.

Furthermore, the examples shown are intended to demonstrate the practical implementation of these rules and their effective limits.

We recommend early dialogue between the customer and supplier: please contact our experts in the Technical Marketing Department.

Further details are given in the data sheet "Available Materials and Dimensions" and special information brochures, such as "Sections for Electrical Engineering" which we will be pleased to send you on request.

Depending on the cross-sectional size and shape, we can also supply sectional wire up to a cross-section of approx. 100 mm<sup>2</sup>. The customers will benefit from extended machine running times, for example by using 1000-kg reels.

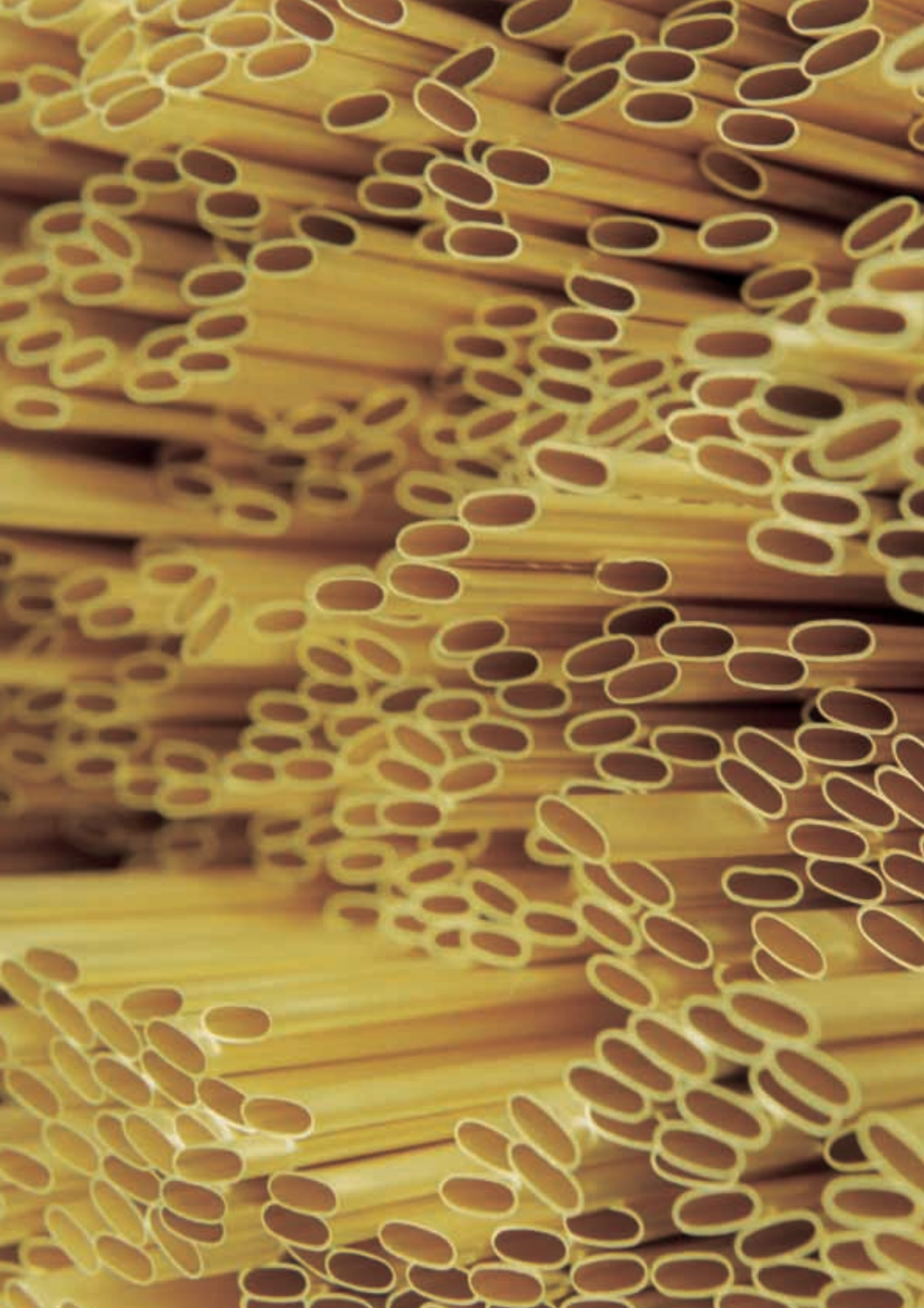
In addition to the shape of the wire cross section, the delivery form should also be specified.

For sectional wire, we recommend to stipulate and agree the position of the cross section of the wire on the drum.

For sections and rods made from copper alloys and special alloys which are not included in our manufacturing programme, we recommend that you contact our subsidiary companies Buntmetall Amstetten and Enzesfeld-Caro Metallwerke (A).



*The production stages from section to finished product*



### Tubes and sectional tubes

Wherever there are very specific product requirements, this is our domain. Some examples:

We supply tubes in precision finish with special tolerances that are considerably tighter than those specified in EN 12449.

We manufacture thin-walled tubes made from certain Wieland materials with an external diameter of up to 85 mm and a maximum diameter to wall thickness ratio – depending on material – of between 160 : 1 and 250 : 1.

We supply round brass tubes with special demands placed on the surface quality, for example with a special inner surface for cylinder tubes used in pneumatics and fluid engineering or for carrying oil – with roughness averages Ra of at most 0.6 mm. Details can be found in the product information leaflets „Brass Tubes for Pneumatic and Hydraulic Cylinders“ and „Tubes for Oil Pumps“.

Round tubes with high demands placed on the quality of the outer surface, suitable for surface treatment, fall in the category 'furniture quality'. The formation of surface defects is reduced by special measures during production, transport and packaging.

Sectional tubes are a useful addition to extruded sections. Sectional tubes frequently represent an ideal alternative

where the extrusion technique reaches its limits.

The manufacturing process generally requires materials with good cold formability.

Sectional tubes (shaped tubes), drawn from round tubes, are characterized by a uniform wall thickness or only very slight differences in wall thickness.

The ratio of largest circumscribing circle to smallest wall thickness is at most 125 : 1.

Manometer spring tubes (Bourdon tubes) with an oval cross section, close wall thickness tolerances as well as tightly restricted strength properties form a speciality of the Wieland production programme. The smallest wall thickness is 0.1 mm. For further information, please refer to product information leaflet „Wieland Manometer Spring Tubes“.

Sectional tubes are manufactured in straight lengths according to the customer's drawing and with tolerances based on EN 12449. They can also be supplied in „furniture quality“.

For further details we refer you to the data sheet „Materials and Dimensions“.

### Miscellaneous

Sections, sectional wire, tubes and sectional tubes are only one of the Wieland product groups. Rods,

bars, round wires and rectangular wires also form part of the production programme of the „Extruded and Drawn Products“ division. Relevant product leaflets are available on request. The Wieland brochure „Semi-Finished Products in Copper and Copper Alloys“ provides a summary of Wieland's complete production programme.

Some special alloys are produced using the spray-compacting process. The alloy is melted under vacuum, atomized with nitrogen and compacted to form a billet. The billets are then extruded and drawn into rods, wires and tubes.

These materials, e.g. phosphorous bronzes with a high tin content, are high-performance copper alloys which are used by our customers to produce cryogenic super conductors and connectors.



... and finally

### The recycling circuit

Wieland semi-finished products made from copper and copper alloys have excellent recycling properties. The scrap generated during production and processing is returned for re-cycling. Copper and copper alloy scrap is a valuable commodity, it not only conserves raw material but also energy resources. The re-cycling is therefore a vital contribution towards the protection of the environment.



Summary

	Product group	Available materials*	Available dimensions** [Diameter of the circumference]	Note
	Sections in straight lengths	<b>K, M, Z, S, N</b>	5-150 mm (0.10-30 kg/m)	
	Sectional wire	<b>K, M, Z, N, B</b>	2.5-20 mm (0.05-0.85 kg/m)	on reels up to max. 1000 kg Delivery formats – Coil – Reel
	Round tubes in straight lengths	<b>K, M, Z, S, B, N</b>	6-260 mm (Wall thickness 0.1-30 mm)	
	Sectional tubes in straight lengths	<b>K, M, Z, S, B, N</b>	5-230 mm (Wall thickness 0.1-17.5 mm)	Minimum internal cross section 20 mm <sup>2</sup>

Packaging

Our standard packaging has been developed over many years and is the result of a practical combination of experience and customer requirements. Both cost economy and the importance of safe transportation are taken into consideration. If possible, please specify the desired type of packaging when placing an order. We will be happy to forward details of our standard packaging.



(**bold** = Main alloys)

\* depending on cross-sectional shape

\*\* depending on material and cross section

For further details we refer you to the data sheet »Materials and Dimensions«

**Quality assurance system and certification**

For many years, our customers all over the world have been relying on products manufactured under the stringent Wieland quality assurance system. Experienced staff carefully monitors the manufacturing processes from arrival of the raw material to dispatch to guarantee the high quality standard of Wieland products.

Members of our independent Quality Control use accurately defined internal procedures to check whether the stipulated quality requirements have been met in all manufacturing steps. The finished product is only released for dispatch by Quality Control if it complies with the order confirmation in every respect.

Production plans and test results are stored and can be recalled at any time. This is a pre-requisite for a continuously high quality standard. The Wieland-Werke AG Quality Management



System (QMS) has been set up in accordance with DIN EN ISO 9001, checked and certified by the neutral certification company BUREAU VERITAS QUALITY INTERNATIONAL (BVQI). This system maintains and guarantees the high demands imposed on Wieland products.

**Technical service**

Please do not hesitate to contact our experts of the Technical Marketing department for their advice in the early stage of the product planning. They will be able

to give useful advice on the selection of materials, type of semi-finished product and on stipulating the condition in order to meet the demands when using and processing the product further.

Furthermore, an experienced team of scientists and engineers are available for the development of new alloys and for clarifying specific material questions.

**Delivery conditions**

Orders are executed according to Wieland-Werke's general terms and conditions of sale which are enclosed with every written order confirmation but can also be sent separately on request. The applicable conditions from the EN sheets are taken into account during the production process, unless otherwise agreed. Delivery according to other national or international standards and customers' specifications can be agreed.

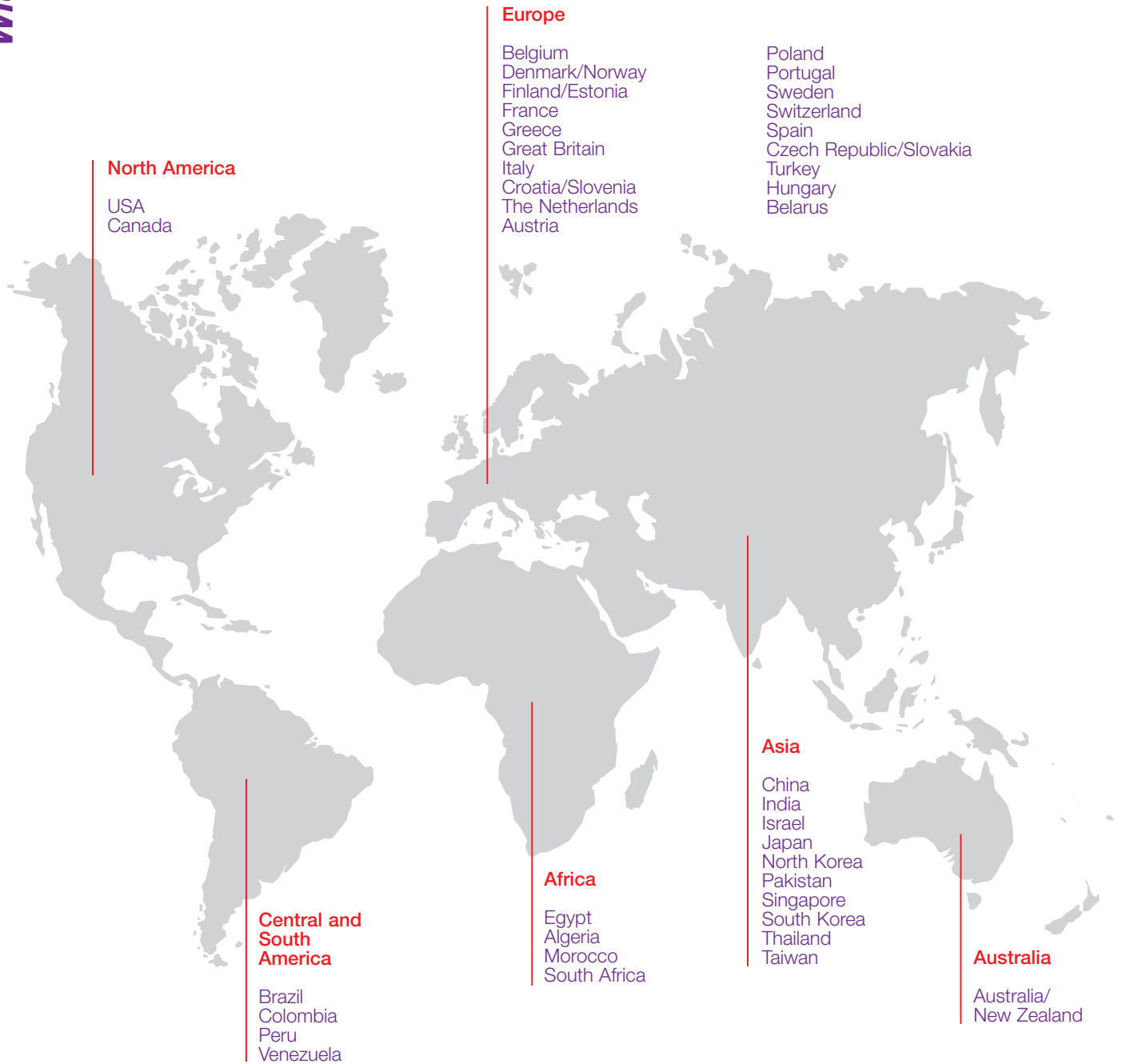




Wieland not only manufactures quality products but aims to become a partner to our customers. Experienced engineers are available for consultation and advice in order for our customers to achieve optimum results from the various stages of product planning, design and manufacture of the finished product. (Simultaneous engineering).







**Close proximity to the customer**  
Through manufacturing companies, slitting centres, sales and marketing offices throughout the world



# **Wieland**

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