



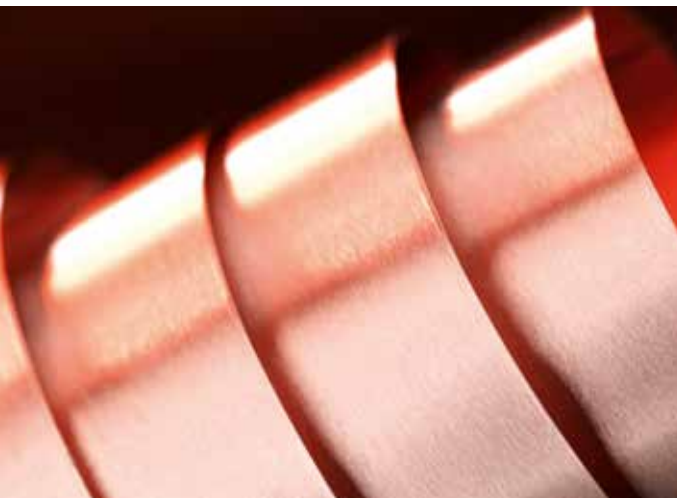
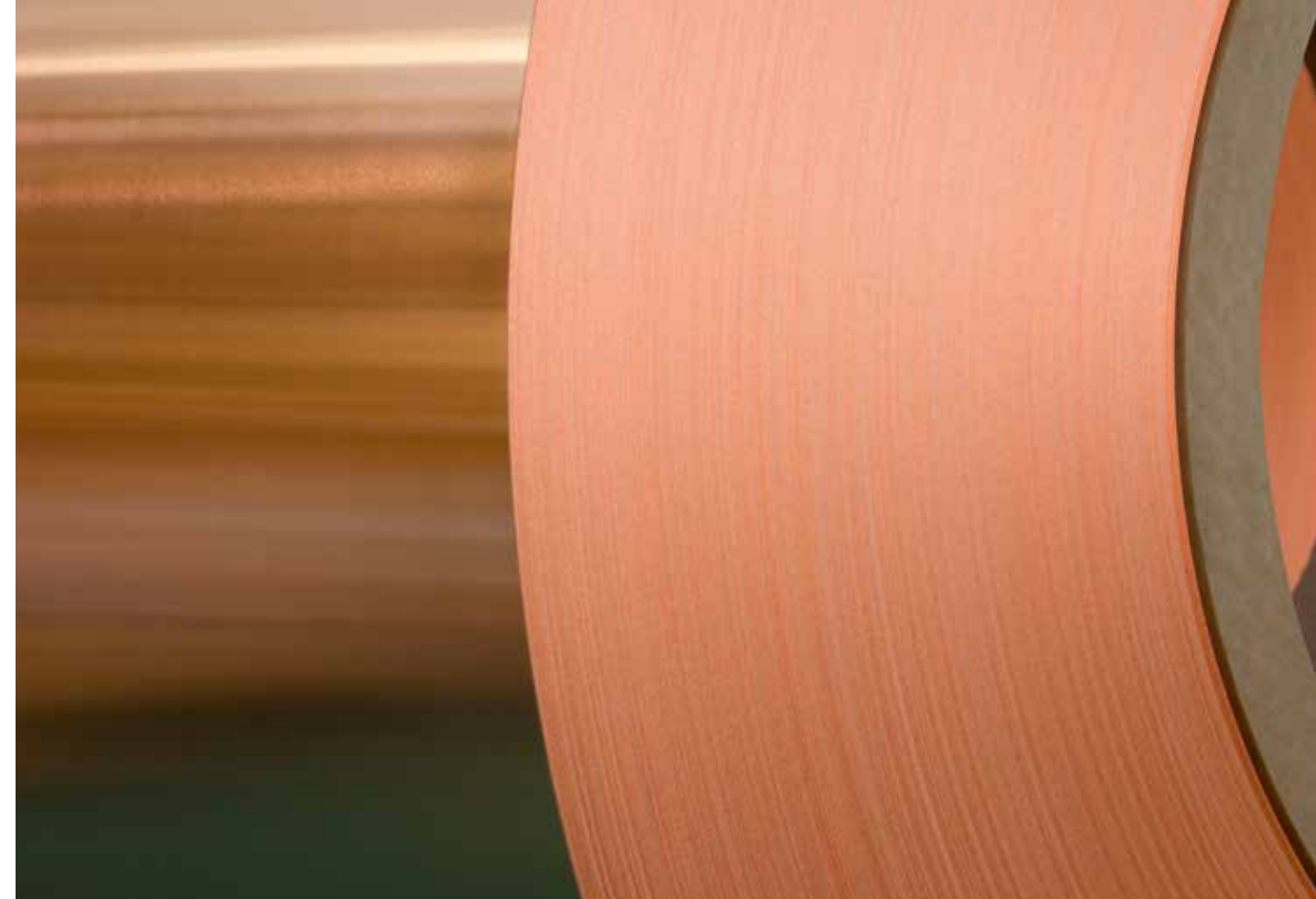
Rolled Products

 **Aurubis**

Facts & Figures

Aurubis Rolled Products

- > **200,000** metric tons of foil, strip, sheet and plate are produced worldwide annually by Aurubis.
- > **98 %** of **global strip demand** is covered by Aurubis' alloy portfolio.
- 3** rolling mills in Europe and the US.
- 3** tin-plating lines in Europe and the US.



Min. 0.025 mm to max. 200 mm
extensive thickness range –
from foil to plate.

Contents

The Group

- 4 Aurubis Group
- 5 Aurubis Rolled Products

The Products

- 6 Offering the broadest range
- 8 Alloys
- 10 Technology with outstanding possibilities
- 11 Electrical and electronical industries
- 12 Tin-plated solutions
- 13 Outstanding service
- 14 Contacts Aurubis Rolled Products

Aurubis Group

Our copper for your life

The company's history is characterized by its dynamics and flexibility, from our founding as a stock corporation in 1866 to today.

Nowadays, the Aurubis Group is ideally positioned; with about 6,300 employees at production sites in Europe and the US and sales offices all over the world, Aurubis is one of the leading integrated copper groups.

Aurubis stands for innovative processes, cutting-edge technology, exemplary environmental protection, customer value and profitability.

Uniquely, Aurubis combines copper production with processing copper into tailor-made products. As a fully integrated global copper company, Aurubis is a leader in smelting, fabricating, refining and recycling copper.

Aurubis shares are part of the Prime Standard Segment of the Deutsche Börse and are listed in the MDAX and the Global Challenges Index (GCX).

Aurubis Rolled Products

Synergies & strengths



Reliability

Aurubis is one of the leading strip producers worldwide, covering the products that are in demand today – from basic alloys to High Performance Alloys (HPAs) and specialty alloys.

Global market leaders in the automotive, electrical and electrical industry trust Aurubis' production capabilities, financial stability, competence and long-term commitment to the copper industry.

Aurubis' alloy portfolio contains over 70 top quality copper and copper alloys: from high purity oxygen-free copper to brass alloys, copper-tin alloys, special CuproBraz® alloys and High Performance Alloys.

Aurubis understands its customers' markets, needs and requirements.

Our focus is on markets where the specific, conductivity-related properties of copper add value for our customers. Customers benefit from our quality, productivity, process efficiency and innovation.

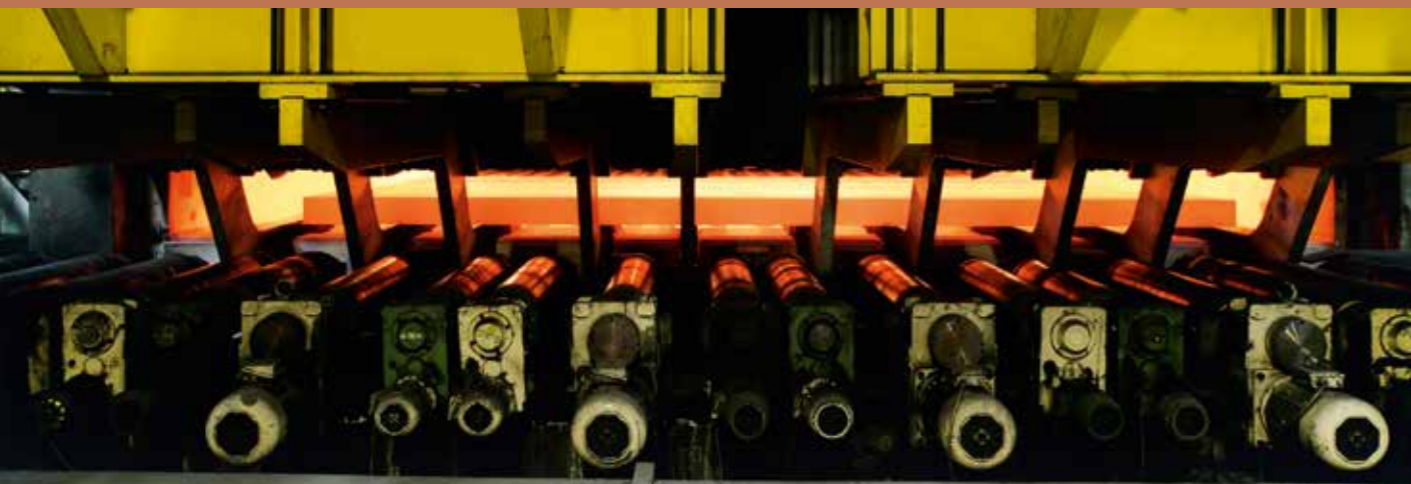
Aurubis values long-term relationships and strives to build those relationships with its business partners.

Operating globally – acting locally

As a global player with four rolling mills in Europe and the US, a network of slitting centers and sales offices as well as distribution partners around the world, Aurubis provides its customers worldwide with excellent local services, also in emerging markets.

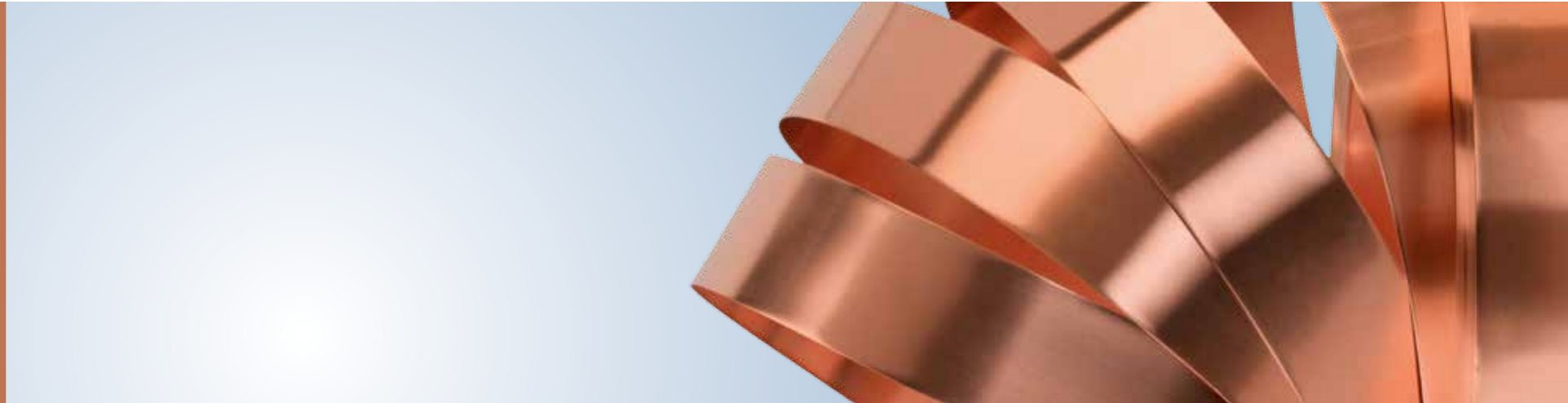
Aurubis fabricates its flat rolled products in Buffalo (US), Pori (Finland), Stolberg (Germany) and Zutphen (Netherlands) with a big portfolio of materials and production capabilities.

All of these factors make Aurubis a global and local partner.



Offering the broadest range

Aurubis is the fabricator with the world's largest product portfolio of foil, strip, sheet, plate and circles produced according to special customer requirements.



Cable strip

Strip for radio frequency and submarine cable and cable wrap for power cable have been part of the production program for decades.

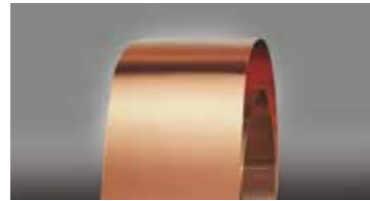
Aurubis' core expertise is in continuous casting and rolling to thin gauges with tight tolerances and homogeneous properties. New applications – such as deep-water dynamic sea cables for floating oil and gas platforms – have been developed to serve customer needs.



Connector strip

Responding to the high demands in the automotive, electrical and electronics industry, Aurubis offers connector and stamped grid products with standard and High Performance Alloys (HPAs). The extensive portfolio is produced with bare or tin-coated surfaces* to the highest standards in the industry.

* as coil, spooled and as ContiCoil®.



Industrial strip

Aurubis provides a full range of copper and copper alloy strip for almost any industrial application in standard dimensions or custom made to special requirements. Coil weights and inner and outer diameters are tailor-made to follow the customer's individual production processes and the requirements of their equipment.

Please ask for our special leaflets as required.



Sheet, plate and circle

Aurubis' sheet and plate have an unrivaled range of dimensions that are unique in the marketplace and manufactured for various applications and critical parts of many diverse products.

The variety of Aurubis' products is matched by the number of applications in which they are found – from MRI scanners to printed circuit boards (PCBs), printing plates for engraving and even sputtering targets.



Architectural Solutions

Aurubis offers a wide range of copper-based architectural products and services for the building and construction industry.

These include copper sheet and strip with different surface qualities, prefabricated systems for facades, roofs and rainwater systems and integrated roof systems. The Nordic Products™ surfaces by Aurubis include variable intensities of green or blue pre-patina-tion and brown pre-oxidation.

Alloys

More than 98 % of global strip demand is covered by our alloy portfolio.

| Pure copper alloys and low-alloyed copper* | | | | | | |
|--|--------|--------|-------|-----------|---------------|----------|
| ISO | UNS | EN | JIS | Buffalo | Pori | Stolberg |
| Cu-OFE (OF-Cu) | C10100 | CW009A | C1011 | C101 | Cu-OFE | PNA 203 |
| Cu-OF | C10200 | CW008A | C1020 | C102 | Cu-OF | |
| Cu-HCP (SE-Cu 57) | C10300 | CW021A | | C103 | Cu-HCP | PNA 210 |
| Cu-XLP / Cu-PHC (SE-Cu 58) | C10300 | CW020A | | C103 | Cu-XLP | PNA 209 |
| CuAg0.03(OF) (CuAg0.03P) | C11300 | | | | | PNA 202 |
| CuAg0.04 (OF) | C10400 | CW017A | | | CuAg0.04 (OF) | |
| CuAg0.045 (OF) | | | | | CuAg0.05 (OF) | |
| CuAg0.10P | C10700 | CW016A | | | CuAg0.10P | PNA 217 |
| CuAg0.10 | C10700 | CW013A | | | CuAg0.10 | |
| CuAg0.10 (OF) | C10700 | CW019A | | | CuAg0.10 (OF) | |
| Cu-ETP (E-Cu) | C11000 | CW004A | C1100 | C110 | Cu-ETP | PNA 211 |
| Cu-DLP | C12000 | CW023A | C1201 | C120 | Cu-DLP | PNA 220 |
| Cu-DHP (SF-Cu) | C12200 | CW024A | C1221 | C122 | Cu-DHP | PNA 219 |
| Cu-DHP | C12210 | CW024A | C1220 | | Cu-DHP | |
| CuTe0.02Sn0.02 | C14530 | | | C1453 | | |
| CuSn0.04 | | | | | CuSn0.04 | |
| CuSn0.09 | | | | | CuSn0.09 | |
| CuSn0.15 | C14415 | CW117C | | C14415 | CuSn0.15 | PNA 216 |
| CuSn0.2 | C14410 | | | C1441 | | PNA 215 |
| CuFe0.1P | C19210 | | | KFC* | | PNA 214 |
| CuZn0.5 | | CW119C | | CuZn0.5 | | PNA 218 |
| Brass | | | | | | |
| ISO | UNS | EN | JIS | Buffalo | Pori | Stolberg |
| CuZn5 | C21000 | CW500L | C2100 | C210 | | PNA 221 |
| CuZn10 | C22000 | CW501L | C2200 | C220 | | PNA 222 |
| CuZn12.5 | C22600 | | | C226 | | |
| CuZn15 | C23000 | CW502L | C2300 | C230 | Nordic Brass™ | PNA 223 |
| CuZn20 | C24000 | CW503L | C2400 | C240 | | PNA 224 |
| CuZn28 | | CW504L | | | | PNA 225 |
| CuZn30 | C26000 | CW505L | C2600 | C260 | | PNA 226 |
| CuZn30As | C26130 | CW707R | | | | |
| CuZn33 | C26800 | CW506L | C2680 | C268 | | PNA 227 |
| CuZn35 | C26800 | | C2680 | | | |
| CuZn35P | | | | | | |
| CuZn36 | C27000 | CW507L | | C270 | | PNA 248 |
| CuZn37 | C27200 | CW508L | C2720 | C272/C274 | | PNA 243 |
| CuZn40 | C28000 | CW509L | C3712 | C280 | | PNA 260 |
| CuZn42 BlueBrass® | | | | | | PNA 277 |

| Alloyed brass | | | | | | |
|---------------------------|--------|--------|-------|---------|----------------|----------|
| ISO | UNS | EN | JIS | Buffalo | Pori | Stolberg |
| CuZn11.5Sn1 | C42200 | | | C422 | | |
| CuZn9.5Sn2 | C42500 | | C4250 | C425 | | |
| CuZn14Fe0.8Sn0.8 | C66430 | | | OCPX | | |
| Copper-tin alloys | | | | | | |
| ISO | UNS | EN | JIS | Buffalo | Pori | Stolberg |
| CuSn2Fe0.1P0.03 | C50715 | | | KLF-5* | | |
| CuSn2Zn2.2Fe0.1P0.03 | C50725 | | | KLF-5Z* | | |
| CuSn1 | | | | | | PNA 298 |
| CuSn2 | | | | | | PNA 288 |
| CuSn4 | C51100 | CW450K | C5111 | C511 | Nordic Bronze™ | PNA 284 |
| CuSn5 | C51000 | CW451K | C5102 | C510 | | PNA 285 |
| CuSn6 | C51900 | CW452K | C5191 | C519 | | PNA 282 |
| CuSn8 | C52100 | CW453K | | C521 | | PNA 283 |
| CuSn10 | C52400 | | | C524 | | PNA 292 |
| CuSn12 | | | | | | PNA 295 |
| Special CuproBraz® alloys | | | | | | |
| ISO | UNS | EN | JIS | Buffalo | Pori | Stolberg |
| CuCr0.2 | | | | | | |
| CuZn15Fe0.8 | C66420 | | | | | |
| Cu64ZnNi3 | C74400 | | | | | |
| Special bronze | | | | | | |
| ISO | UNS | EN | JIS | Buffalo | Pori | Stolberg |
| CuAl5Zn5Sn1 | | | | | Nordic Royal™ | PNA 319 |
| CuNi10Fe1Mn | C70600 | CW352H | | | | PNA 334 |
| High performance alloys | | | | | | |
| ISO | UNS | EN | JIS | Buffalo | Pori | Stolberg |
| CuZr0.1 | C15100 | | | C151 | | PNA 296 |
| CuMg0.1 | C15500 | | | C155 | | PNA 297 |
| CuMg0.6 | C18665 | | | C18665 | | PNA 395 |
| CuNi1.5Si | C19010 | | | C19010 | | PNA 290 |
| CuFe2P | C19400 | CW107C | C1940 | C194 | | PNA 212 |
| CuFe2PMg | C19400 | | | C194 | | PNA 206 |
| CuFe0.7MgP | C19700 | | | C197 | | PNA 205 |
| CuSn1.2Ni0.8P0.07 | C19040 | | | CAC5* | | |
| CuNi0.5Sn0.5 | C19022 | | | UNILLOY | | |
| CuNi1.8Si0.4Zn1.1SnMg | C64760 | | | CAC60* | | |
| CuNi3SiMg | C70250 | | | C7025 | | PNA 370 |
| CuNi2Si0.4 | C70260 | CW111C | | C7026 | | |

Aurubis also supplies slightly modified alloys with special properties, e.g. in accordance with Oeko-Tex Standard 100 and US Federal Regulations.

* available in US.

Technology with outstanding possibilities



Slitting Centers

Aurubis cooperates with a network of slitting and distribution centers in Europe and Asia.

Aurubis has the largest continuous casting production capacities worldwide. Several state-of-the-art casting technologies such as cake casting (with consecutive hot rolling) and vertical and horizontal strip casting (both with consecutive cold rolling) are used to produce consistent and high quality rolled products.

These different technologies provide high flexibility, custom products and efficient mono-manufacturing of large lot sizes. Aurubis produces the largest copper coils in the world with the tightest tolerances. In addition, Aurubis uses the most efficient technology and offers innovative assistance in Research & Development as well as technical

cooperation for customers. The technical center for developing and manufacturing thermal management solutions offers accelerated corrosion tests and wind tunnel tests for radiators and charge air coolers (CACs), for instance. Aurubis has the variety of material, production capabilities and knowledge to meet customer requirements.

| Unique range of dimensions | | | | |
|-----------------------------|-----------------|-------------|---------------------|-----------------|
| | Thickness in mm | Width in mm | Thickness in inches | Width in inches |
| Industrial strip | 0.075 – 7.000 | 5 – 1219 | 0.0030 – 0.2756 | 0.197 – 48.000 |
| Engine cooling strip | 0.025 – 0.500 | 5 – 320 | 0.0010 – 0.0197 | 0.197 – 12.598 |
| Cable strip & foil | 0.025 – 0.500 | 5 – 635 | 0.0010 – 0.0197 | 0.197 – 25.000 |
| Industrial foil | 0.025 – 0.100 | 10 – 600 | 0.0010 – 0.0040 | 0.394 – 23.622 |
| Sheets < 2 mm / 0.0787 inch | 0.300 – 2.000 | 350 – 1219 | 0.0118 – 0.0787 | 13.780 – 48.000 |
| Sheets > 2 mm / 0.0787 inch | 2.000 – 6.000 | 540 – 1100 | 0.0787 – 0.2366 | 21.598 – 43.307 |
| Plates | 6.000 – 200 | 100 – 1100 | 0.2362 – 7.8740 | 3.937 – 43.307 |
| Circles | 0.300 – 3.000 | 65 – 1050 | 0.0118 – 0.1181 | 2.559 – 41.338 |

Ratio of width to thickness on request.

Electrical and electronical industries

High purity, excellent surfaces and microalloyed compositions

The main consumers of copper are in the electrical and electronical industry due to the excellent electrical and thermal conductivity of copper. Copper is an ideal material for heavy gauge printed circuit boards (PCBs), switches, connectors, transformers, heat sinks and base plates, bus bars, commutators and many other demanding applications like for copper ceramic substrates (DCB, AMB).

The combination of chemical composition and excellent surface quality of higher thicknesses or dimensions covers different applications.

The properties of pure copper can still be improved by micro-alloyed amounts of silver that enable use under high, demanding temperatures.



Quality Assurance

Aurubis monitors and documents product quality using a Quality Management System. All rolling mills are certified in accordance with ISO/TS 16949 and/or DIN EN ISO 9001:2008.

Tin-plated solutions with outstanding possibilities



Aurubis operates two hot-dip tinning and one electroplating lines in Europe and the US and supplies customers with tinned products.

We offer additional types of coatings, such as TN, TQ, silver and copper-nickel, via service partners.

Properties and applications

In order to meet the high demands of the automotive, electrical and electronical industries on connectors and stamped grids – such as low insertion forces, good corrosion resistance and good solderability – the strip used is required to have surface treatments. Three main processes are used for

coating: hot-dip tinning, electroplating and electroplating with a subsequent reflow treatment. Accordingly, copper and copper alloy strip can be coated with a variety of metals. Pure tin coatings are particularly important due to their economic efficiency.

| Hot-Dip Tinning | | | |
|-----------------------|---------------------------------------|--|---|
| Strip thickness in mm | | Tin layer thickness incl. tolerances (standard tin-plating 99.9 %) | |
| 0.10 - 1.50 | Air level mechanical wipe | 0.8 – 1.5 µm | Low insertion force |
| | | 1.0 – 3.0 µm | Low insertion force, corrosion protection |
| | | 2.0 – 4.0 µm 3.0 – 6.0 µm | Good corrosion protection |
| | | 4.0 – 8.0 µm 5.0 – 10.0 µm | Good solderability |
| | | 10.0 – 16.0 µm | Special applications |
| Electroplating | | | |
| Strip thickness in mm | | Main properties | |
| 0.20 – 0.80 | Tin matte / bright / brushed | Good electrical contact, low insertion force and / or corrosion protection | |
| | Tin reflowed | Mitigates whiskers | |
| | Nickel | Special applications and diffusion barrier (underlayer) | |
| | TN (available in US) | Very low insertion force | |
| | TQ (available in US) | Long-term solderability | |
| 0.10 – 4.0 | Tin matte / bright / brushed | Good electrical contact, low insertion force and / or corrosion protection | |
| 0.10 – 2.0 | Tin reflowed | Mitigates tin whiskers | |
| | Advanced reflow tin | Long-term solderability | |
| | Super thin advanced reflow tin (STAR) | Very low insertion force | |
| | Nickel | Special applications and diffusion barrier (underlayer) | |
| | Silver | High corrosion protection, higher temperature resistance | |

■ In-house production

Copper underlayer and selective plating on request.

Outstanding Service

Commercial Services

- » Copper market expertise and many years of experience
- » Strong and financially healthy long-term copper supply
- » Provision of the latest copper market information
- » Hedging advice and support

Technical Services

- » Support from our network of experienced technicians and engineers in selecting and processing semi-finished products
- » Laboratory with facilities for extensive, state-of-the-art physical and chemical analyses including scanning electron microscopy
- » Recycling concepts for our customers to increase economic efficiency

Logistics

- » Maximum reliability of supply and flexibility, thanks to the integrated chain from concentrate to strip
- » Joint projects with our customers to optimize the production chain
- » Worldwide availability thanks to the international sales network: Operating globally – acting locally

Before, during and of course also after purchase, Aurubis offers its customers comprehensive commercial, technical and logistical services, geared entirely to the needs of our customers.

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Metals for Progress

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