Recycling

Our Copper for your Life
Facts & Figures
Recycling

For 10,000 years
• mankind has been using copper. Copper originating from that time is still in circulation today because copper can be recycled as often as required without loss of quality.

For 150 years
• Aurubis has been involved in metal recycling. That makes us experts in this field.

650,000 t
• of the most varied recycling raw materials are processed each year into end products in the Group.

99.99 %
• copper content in our high-purity copper cathodes.

60
• countries are the source of our recycling raw materials.
International excellence in copper recycling

Metals are the prerequisites for technical progress and a high standard of living. The increasing demand worldwide is confronted by limited resources, however. Metal recycling is therefore an important source of raw materials – especially for countries like Germany with few natural resources. Recycling thus makes an important contribution to supply security, sustainability and to conserving resources. Aurubis strives to maintain resources for future generations. We therefore use environmentally sound state-of-the-art technologies in recycling.

Founded as a stock corporation in 1866, Aurubis has since positioned itself optimally in the market. The Group is meanwhile the leading copper producer in Europe and the largest copper recycler worldwide. With about 6,400 employees at production sites in Europe and the USA as well as sales offices around the world, the Aurubis Group is one of the leading integrated copper groups. We are a global leader in copper recycling.

Aurubis stands for innovative prowess, the leading edge in technology, exemplary environmental protection, customer value and profitability.
Copper recycling at Aurubis

Raw materials
Concentrates and recycling materials are the raw materials from which copper is produced.

- Concentrates
- Direct melt
- Electronic scrap
- Copper scrap
- Industrial residues
The copper is processed into products. Some products are already the result of copper production.

**Products**
- Cathodes
- Continuous cast shapes
- Wire rod
- Strips/foils
- Specialty rod/profiles, shaped wire
- Precious metals
- Other metals
- Sulfuric acid
- Iron silicate

**Slitting Centers**
Service Centers located near our customers cut strips to the desired dimensions.

**Sales and distribution**
An international sales and distribution network markets our products.
Our contribution to sustainability

The careful handling of resources is a matter of course at Aurubis. Metals which are contained in process residues of the non-ferrous metal industry, in waste or in used products become high-grade raw materials again at Aurubis.

In the Group’s recycling center in Lünen, we treat an extensive range of complex recycling materials of various qualities and compositions, e.g., metal-bearing industrial residues, copper-bearing shredder materials and electrical and electronic scrap.
SuStaInabIlIty and organIzatIon

About a third of the copper produced in the Aurubis Group is sourced from recycling materials. The production of cathode copper in Lünen is based totally on recycling raw materials. The Kayser Recycling System (KRS) consists of the most modern and environmentally friendly facilities for melting and enriching non-ferrous and precious metals. A wide range of recycling raw materials is processed here in an environmentally compatible manner and the recyclable fractions are returned to the economic cycle.

Recycling raw materials are also processed to produce cathode copper and precious metals at the Hamburg, Pirdop and Olen sites. The production of cathode copper in Hamburg and Pirdop is primarily based on copper concentrate processing.

Our recycling facilities set benchmarks worldwide as regards technology and environmental protection. Thanks to constant capital investment to improve technologies and environmental protection, demand for primary energy has been reduced by 25 % and CO₂ emissions have decreased by 13 % per ton of raw material input from 2005 to 2011 with a 40 % increase in the throughput of recycling raw materials.

The production processes and methods as well as the services are certified in accordance with DIN EN ISO 9001 and DIN EN ISO 14001. Furthermore, Aurubis has been intensively involved in implementing and establishing the REACH directive from the very beginning. We therefore make an important contribution to protecting the natural fundamentals of life for future generations.

The subsidiaries CABLO Metall-Recycling und Handel GmbH and E.R.N. Elektro-Recycling NORD GmbH, which are active as specialized waste management companies in different market segments, are also part of the Recycling business unit.

CABLO with processing operations in Fehrbellin and Strass is specialized in metal/plastic separation, in particular in the recycling of cable production waste and cable scrap. High-quality metal granules are produced from the cable in accordance with customer specifications. The services provided by CABLO close the material cycles completely and long-term. The cable industry is supplied with the extracted raw materials in a usable form such as copper cathodes, copper wire rod or conductive aluminum.

E.R.N. in Hamburg is a service center in the dismantling, recycling and disposal of electric and electronic appliances. In addition, it supports its customers in collecting individual appliances or components and in dismantling and transporting plants. E.R.N. also assists small and medium-sized recyclers by purchasing small units of dismantling fractions and combines these into smelter-compatible delivery quantities.
Marketable cathode copper, which is no different in quality from copper made from primary raw materials, is produced from the various recycling raw materials after the refining process in the tankhouse. However, Aurubis Recycling achieves even more. As part of multi-metal recycling, precious metals, nickel, tin, lead, zinc products and iron silicate products are also produced from the – in some cases – very complex feed materials. Aurubis uses the properties of copper and other metals to ensure recycling without quality loss.
YOUR WASTE – OUR RAW MATERIALS
As the market leader in copper recycling, we have a strong market presence. Aurubis procures raw materials worldwide from more than 60 countries; nevertheless, the main source is Europe.

The following recycling raw materials are bought and processed as part of Aurubis’ multi-metal recycling:

» Bright wire scrap
» Copper granules
» Copper scrap
» Remelted copper ingots
» Gunmetal scrap
» Brass scrap
» Aluminum bronze scrap
» Copper/brass radiators
» Non-ferrous metal shredder
» Electronic scrap, e.g., printed circuit boards and components
» Electric scrap
» Other precious metal-bearing materials
» Copper and aluminum cable scrap
» Copper/lead granules
» Tin/lead-bearing recycling raw materials
» Lead scrap
» Copper/iron materials
» Copper-bearing residues (slag, dross, ash, dust, other slimes)
» Metal hydroxide slimes, foundry sands, catalysts
Well positioned in all sectors

The Aurubis sites are kept supplied with recycling raw materials centrally by the raw material procurement sector in Lünen and are divided into Metal Scrap Recycling, Electronic Scrap Recycling and Industrial Recycling.

In addition, special materials with high precious metal contents and other recycling raw materials are procured in Hamburg for processing in on-site facilities.

The Metal Scrap Recycling sector ensures that the Aurubis production sites are well supplied with copper scrap and copper alloy scrap in the daily spot business. Our Electronic Scrap Recycling offers all-around solutions for recycling electric and electronic end-of-life appliances and for many fractions from the output of electronic scrap recycling companies. Business partners in the Industrial Recycling sector include companies in the automotive supplier industry, the chemical industry and the waste disposal industry as well as companies from the respective value-added stages. This sector continues to market the high-quality by-products from recycling.
We procure recycling materials in the form of copper scrap and copper alloy scrap in local, national and international markets. By sourcing supplies from some 60 countries worldwide, we have considerable market exposure. The supply of recycling raw materials from the trade is supported by a wide network of buying agents in our core markets of the United Kingdom, Italy, Spain, North America and the CIS countries.
A VALUABLE BUSINESS – SPECIAL REQUIREMENTS FOR SAMPLING
Electric and electronic appliances are used by more and more people worldwide while the useful life of high-quality products in particular is becoming appreciably shorter. Since 2006 producers and distributors of electric and electronic appliances in Europe have been obliged to take back end-of-life appliances from the consumer and to recycle them in an environmentally sound manner.

Recycling electronic appliances is very demanding on account of the complex appliance and material structures. Aurubis is your competent partner for this, with modern, environmentally safe plant technology and extensive experience in electrical and electronic scrap recycling.

Our range of services stretches from mechanical material preparation to material-specific sampling and analysis to conversion into raw materials in line with market trends.
Modern processing facilities in the Aurubis Group enable the input of industrial residues and waste that would formerly have found their way to landfills. Complex materials can be recycled thanks to the numerous processing options. The range of the processed recycling raw materials varies from classic residues from industrial collection points along the copper value-added chain to metal-bearing waste from different industrial sectors, such as the chemical industry. The individual raw materials are used both for direct metal extraction and as auxiliaries and supplies in our production processes. At the same time, no production-related waste arises in the Aurubis recycling plants. The charged materials are almost totally recycled in an environmentally friendly process.
## Recycling Process

### SAMPLING AND PRETREATMENT OF RECYCLING MATERIALS

<table>
<thead>
<tr>
<th>Sampling processes</th>
<th>Electrical and electronic scrap, printed circuit boards, components, also in shredded form, etc.</th>
<th>Residues, ashes, slags, slimes, dusts, industrial residues, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alloy scrap</strong> in the form of chips and pieces, metal bars, CuFe materials, shredder, scrap, granules</td>
<td><strong>Crushing and grinding</strong>, mixing, reducing, pipette, mixing and separating, melting, pulverizing</td>
<td><strong>Mixing, agglomerating</strong></td>
</tr>
<tr>
<td><strong>Mixing, reducing, sawing, drilling, melting</strong></td>
<td><strong>Multi-stage crushing and dividing to &lt;1 mm, pulverizing and smelting</strong></td>
<td><strong>Crushing until furnace-compatible, mixing, agglomerating, separating Fe, Al, plastics</strong></td>
</tr>
</tbody>
</table>

### Analytics

| **Appliance analytics, wet chemistry, evaluation** | **Wet chemistry** | **Appliance analytics, wet chemistry** |

### Pretreatment

| **Mixing, crushing** | **Mixing, agglomerating** |

### Feed

| **KRS, anode furnace** | **KRS, converter** | **KRS, electric furnace** |

### Delivery by truck:
- Residues, electronic scrap, copper scrap
- Sampling
- Material preparation
- Smelting furnace
- TBRC* Recycling System
- Anode furnace
- Tankhouse
- Cathode
- Precious metal recovery

*Top Blown Rotary Converter*
At a glance

Aurubis services in the recycling sector
Aurubis attributes particular importance to providing top service. As a leading company in metal recycling, we offer tailor-made service packages: individual contracts, correct value determination and environmentally friendly processing.

We offer:

» Competitive prices and terms within the context of pricing agreements customary in the industry
» Advice on all aspects of metallurgical recycling
» Professional sampling and assaying as the basis of precise material evaluation
» Complete processing of all recycling raw materials in state-of-the-art facilities adhering to the highest environmental protection and occupational safety standards
» Complete destruction of components or products to avoid reuse and to protect know-how
» Logistics offers with selected partners, from single deliveries to site-related complete disposal
» Preparation and processing of mandatory disposal approval procedures: drafting recycling certificates and notifications in the event of transboundary movement of waste
» Completion of customs clearance in international trade at our works
» Up-to-date market information
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