

Copper hollow conductors



**LUVATA**





# The longest hollow conductor in the world

We have been manufacturing copper hollow conductors for more than four decades and we understand the importance of reliability for our customers. The consequences of a component failure can be disastrous – particularly in applications such as MRI scanners, particle accelerators, nuclear research facilities, or the stator winding of a 1000 MW power generator. That's why our hollow conductors are designed to the highest quality standards, and are chosen by the world's leading manufacturers, time and time again.

Our latest innovation is the Mileon® jointless hollow conductor – the longest hollow conductor in the world. This has been developed in response to the customer demand for seamless magnetic windings that increase the reliability, constructability and performance of their products.

*“I have had the good fortune to meet the owners, engineers and scientists of the companies that use our hollow conductors and I have felt the enthusiasm and pride they have for their work. They all have a mission. It may be to treat a cancer that was previously believed to be incurable; it may be to find the Higgs particle and explain how the universe works; or it may be something more humble. Whatever their mission, I am proud that Luvata has played a part in helping them to achieve it. I am looking forward helping our customers and their customers to succeed and prosper for decades to come.”*

  
**Jussi Helavirta**  
President & CEO  
Luvata

# Custom-built solutions for many different applications

When high magnetic fields are required, the magnetic winding is made from internally cooled hollow sections. While the majority are still looking for square HC with a round or rectangular hole, the demand for different outer dimensions (OD) and hole sizes is growing.

While high energy physics (HEP) magnets are getting bigger, so is the hollow conductor OD and hole sizes. In contrast for the healthcare industry, where turns and teslas are everything, we offer smaller OD and hole sizes. In addition to traditional shapes we produce several hollow conductors with non-traditional cross-sections as well.

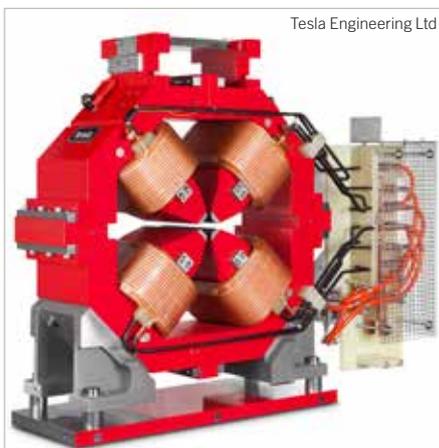
At Luvata we have been manufacturing copper hollow conductors to the most demanding applications for over five decades. We have used our knowledge and experience to help our customers to build particle accelerators, plasma research devices, MRI scanners and ion implantation units that are more efficient and less costly.

## Luvata hollow conductors are used in a number of applications:

- Particle accelerators
- MRI scanners
- Ion implantation units for the microcircuit industry
- Plasma research devices
- Electric vehicles
- Heating/cooling in battery packs
- Generator windings
- Electrodynamics test systems
- Induction furnaces
- Electromagnetic stirrers
- High gradient separators



High-efficiency hybrid vehicle engine with electric motor.



Research magnet



European X-ray Free-Electron Laser (XFEL).



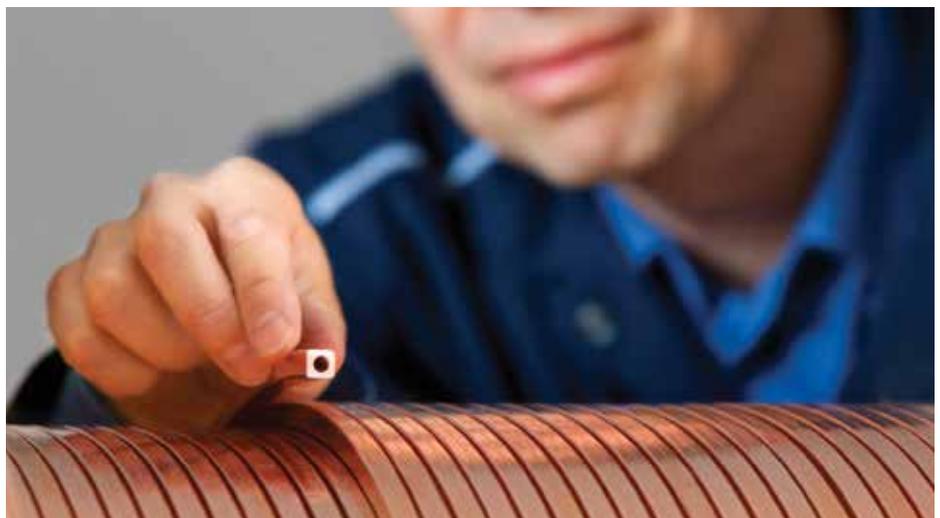
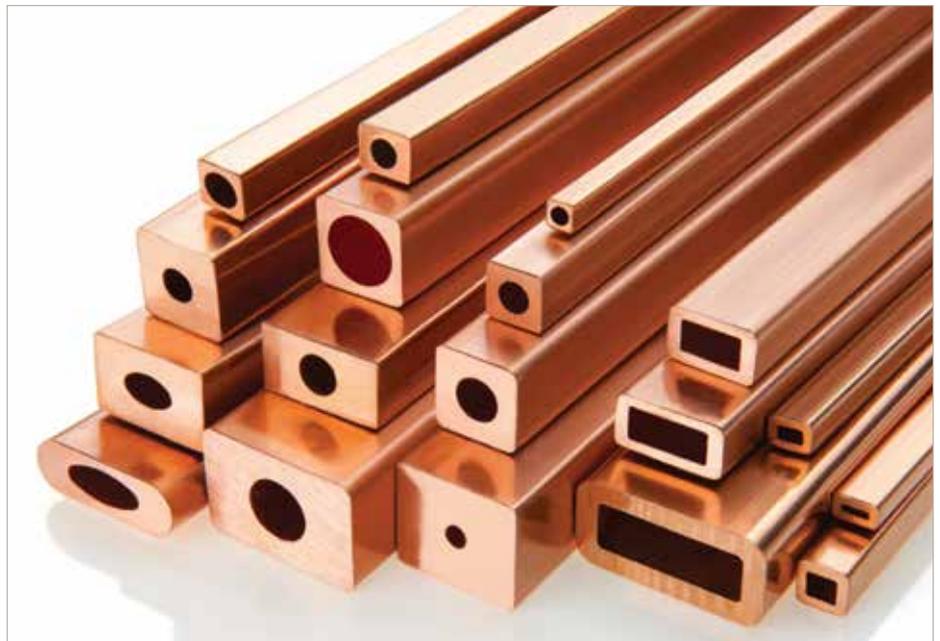
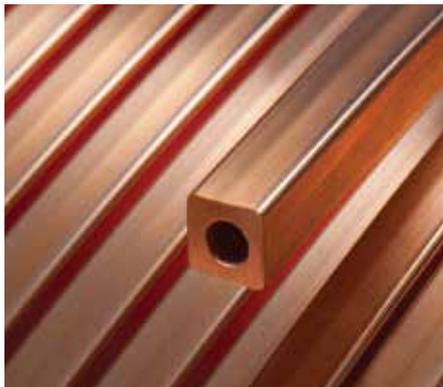
MRI scanner

Every joint in a water cooled magnet is a potential cause of leakage. So the longer each individual coil is, the more the risk is reduced. With the aim of eliminating the joints within the magnet altogether, we have developed extremely long Mileon coils. The length of these coils, rather than being measured in meters, is now measured in hundreds, or even thousands of meters.

Mileon coils are manufactured using only oxygen-free copper, and are subject to the same stringent quality criteria that we apply to our other hollow conductor products.

#### Mileon coil advantages:

- No joints
- Highest quality copper
- Less copper wastage
- Precise delivery quantities



Using large Mileon coils means that less scrap is generated in the magnet manufacturing process, and expensive copper is saved. The longer coils also provide increased flexibility in production compared with shorter coils that are cut to pre-determined lengths.

Mileon coils are typically delivered on large wooden spools, which require less packaging materials and are recyclable. Alternative environmentally-friendly packaging options are also available to meet every customer's unique needs.

# Technical data

All impurities reduce the electrical conductivity of copper, which is why we make Luvata hollow conductors from OF-OK high purity oxygen-free copper. As a result of its purity, Luvata OF-OK has typical electrical conductivity of 100-102 %IACS and thermal conductivity of 390 W/Km.

The maximum oxygen content of 5 ppm (0.0005%) makes the material immune to hydrogen embrittlement and ensures safe joining with all brazing and welding methods.

## Alloys

| Alloy        | EN     | ASTM   | Electrical conductivity |       | Thermal conductivity<br>W/Km |
|--------------|--------|--------|-------------------------|-------|------------------------------|
|              |        |        | m/Ωmm <sup>2</sup>      | IACS% |                              |
| OFE-OK       | CW009A | C10100 | 58,6                    | 101,5 | 391                          |
| OF-OK        | CW008A | C10200 | 58,3                    | 100   | 390                          |
| CuAg0.10(OF) | CW019A | C10700 | 57,7                    | 99,5  | 388                          |

## Hundreds of different conductors

Our long history in making hollow conductors has given us thousands of tools for creating the most sizes of conductors within very short time scales. We can also supply conductors in small quantities for testing and prototyping purposes.

## Hollow conductors

Size range: Different shapes from 3 x 3 mm up to 100 x 100 mm.

## Delivery forms

|   |  |
|---|--|
| Mileon jointless long lengths           | up to 2500 kg depending on dimension, on a wooden reel |
| Loose coils, pancake coils or LWC coils | max 50 – 400 kg depending on dimension                 |
| Spools for small sizes                  | plywood or plastic spools                              |
| Straight lengths                        | up to 16 m   |



The OF-OK used in our hollow conductors is cast in our own foundry in electric furnaces using selected high purity raw materials. This means we can control the whole manufacturing process from casting to signing the inspection certification, and ensure the consistency of our product from batch to batch.

When necessary OF-OK is alloyed with silver (Ag) to increase both the softening temperature and creep resistance of the alloy without any significant sacrifice of its other properties.

Please visit [www.luvata.com/hollow-conductors](http://www.luvata.com/hollow-conductors), for our frequently updated tool list. If you don't find what you are looking for, contact us and our engineers will happily create a bespoke solution for you.

## Just some of our hollow conductor profiles



# About Luvata

## What does Luvata see for the future?

We will use our unique technology know-how to influence the development of a sustainable modern world. We have always aimed to improve our customers' products and processes, and to help them increase the efficiency of their businesses. But our vision is bigger than that. If human society is going to maintain the lifestyle that we all enjoy today AND offer it to emerging societies, we will all need to become much more efficient and to take much less from the planet. We are helping companies to make their products, processes and production more sustainable: do more, waste less, and pollute less.

## What's Luvata's plan for getting there?

Luvata looks to build on its distinct strengths, bringing expertise and dedication to high growth regions and adjacent markets around the world. We are stepping into niche and specialist markets with our

high-value, engineered solutions, and we are developing new solutions in partnership with our customers to conquer challenges at the front end of market demand.

## How does Luvata behave?

In doing all this, we resolve to be the partner of choice for our customers, the employer of choice for our staff, and to be a positive and responsible friend to everyone else. We strive to be open-minded and focused on getting results; and when we promise, we deliver.

## Where in the world are we?

Our global footprint stretches across the Americas, Europe and Asia. Our diversity of locations, cultures and markets gives us access to a wealth of knowledge and expertise that simply keeps growing. It means that we are local to our customers, wherever in the world they are and can be responsive to their needs, including fast local delivery straight to the door.

1400 employees, 12 locations, 7 countries



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### About Luvata

Luvata is a world leader in metal solutions manufacturing and related engineering services to industries such as renewable energy, automotive, healthcare, and power generation and distribution. The company's continued success is attributed to its longevity, technological excellence and strategy of building partnerships beyond metals. Employing over 1,400 staff in 7 countries, Luvata works in partnership with customers such as ABB, CERN, Siemens and Toyota. Luvata is a group company of Mitsubishi Materials Corporation.



[www.luvata.com](http://www.luvata.com)

