



## Hollow Conductors

Copper hollow conductors for the most demanding applications, from MRI scanners to electric vehicles and power generators.

**LUVATA**  
Partnerships with a Promise



## A history of delivery and innovation

At Luvata, we have been producing copper hollow conductors for over half a century. In that time, we have built a track record for reliability, adaptability and constant innovation. Our hollow conductors can be found in MRI scanners, particle accelerators, semiconductors, nuclear research facilities and the stator winding of 1600 MW power generators. Our innovations include Mileon®, the longest jointless hollow conductor available anywhere. Developed to meet the demand for seamless magnetic windings, it is uniquely durable and reliable. We also have in-house billet casting, giving us complete control over the quality of our products.

### **Our strength lies in our relationships**

We believe in forging strong, long-term relationships with our customers, our suppliers and our staff. Our manufacturing staff are fully engaged with our customers' businesses, and have an in-depth understanding of both the end applications and the technical requirements. This enables us to work closely with our customers to problem-solve, innovate and design customized solutions to specific projects. Our employees typically stay with us for many years, ensuring consistency and quality that is second-to-none. All of which enables us to add value over and above a traditional supplier relationship, and build partnerships which really last.

*“As a global company, we have the power to contribute positively to a better future, and that is a responsibility we take seriously. The megatrends in our markets mean the use of copper products can only increase, and our hollow conductors have an important role to play in the decarbonization of society. We all want to see a more sustainable future, and Luvata is determined to be a force for good in the development of e-mobility, the green transition, electrification and in healthcare and scientific research.*

*The world is changing rapidly, and with our history of innovation and collaboration, we are well placed to develop technically-demanding products which deliver exactly what is needed and make the most of the resources available to us. This is what drives us, and this is why we have pledged Partnerships with a Promise. We are determined to benefit people, society and the Earth and play our part in building a better tomorrow. ”*

A handwritten signature in black ink, appearing to read 'Pekka Kleemola'.

President & CEO  
**Pekka Kleemola**

# Bespoke hollow conductors to meet every need

We have been manufacturing copper hollow conductors for over sixty years, helping to build the most demanding scientific applications, MRI scanners and power generators. Much of what we do is tailor-made, and delivered to the most exacting requirements.

The specifications for hollow conductors change all the time. Although most applications call for square hollow conductors with round or rectangular holes in standard sizes, there is a growing need for alternative outer dimensions (OD) or hole sizes. At Luvata, we have been asked for many different shapes and sizes, and have always delivered the perfect solution.

High energy physics (HEP) magnets are getting bigger, and need larger hollow conductor ODs and hole sizes. Meanwhile, for the healthcare industry, where turns and teslas are everything, smaller ODs and hole sizes are required. And we are often asked to produce non-standard cross-sections in a variety of shapes and sizes. With the widest range of tools on the

market, we have the flexibility to adapt to our customers' needs.

Looking to the future, we are applying our expertise to the growing demand for Electric Vehicles (EVs). Direct-cooled motors with hollow conductor stators have several advantages over the indirect-cooled motors currently being used. Our solution enables higher power density and can be constructed from standard materials in smaller sizes, making EVs even more efficient and more affordable.

We help our customers build particle accelerators, plasma research devices, MRI scanners and ion implantation units that are efficient and cost-effective.

## Some of the end uses for our products

- Electric vehicles (EVs) / Stator direct cooling
- Particle accelerators
- MRI scanners
- Semiconductors
- Ion implantation units for the microcircuit industry
- Plasma research devices / fusion energy
- Heating / cooling in battery packs
- Generator windings
- Electrodynamic vibration test systems
- Induction furnaces
- Electromagnetic stirrers
- High gradient separators



Wind farm generator windings



Particle accelerator



Electric vehicle



MRI scanner

# Mileon® jointless hollow conductors

Extremely long coils help eradicate leakage, and mean reductions in waste and packaging.

Every joint in a water-cooled application is a potential cause of leakage. So the longer each individual coil is, the more the risk is reduced. We developed our extremely long Mileon® coils with the aim of eliminating the joints altogether. Now, Mileon® coils, rather than being measured in meters, are 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.

With Mileon® coils, less scrap is generated in the manufacturing process, and expensive copper is saved. The longer coils also provide increased flexibility in production compared with shorter coils that are cut to predetermined lengths. Mileon® coils are typically delivered on large wooden

spools, which require less packaging and are recyclable, and alternative environmentally friendly packaging options are also available.

## The advantages of Mileon® coils

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



## 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.

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.

### Alloys

Alloy	EN	ASTM	Electrical conductivity		Thermal conductivity
			MS/m	IACS%	W/Km
OFE-OK®	CW009A	C10100	58,6	101,5	391
OF-OK®	CW008A	C10200	58,3	100	390
CuAg.0.04(OF)	CW017A	C10400	57.7	99.5	388
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 all sizes of conductors within very short time scales. We can also supply conductors in small quantities for testing and prototyping purposes.

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

### Just some of our hollow conductor profiles



### Hollow conductors

Size range: Different shapes from 3 x 2 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



Scan QR code for access to our online tool list.

## Luvata - Partnerships with a Promise

### Working for People, Society and the Earth

We all want to ensure a sustainable future for our planet. As a manufacturer, we know that we have both an opportunity and a responsibility to contribute positively to the changes needed to secure that future. We have stated that our vision is to be the leading provider of copper solutions that benefit people, society and the earth, and this is a serious commitment. We are active in markets such as e-mobility, healthcare, electrification and the green transition, all of which have a need for copper products. We believe that our innovations will help drive these markets forwards, making green solutions more easily accessible to all.

We also recognize the need for our operations to be sustainable. To this end, we are striving to reduce greenhouse gas emissions, aiming to be using 100% renewable electricity by 2035 and to be fully carbon neutral by 2045.

### Helping our customers grow and thrive

We have always worked in partnership with our customers, getting to know their businesses and collaborating on custom-made solutions. We take great satisfaction in seeing our customers thrive, and knowing that we played a part in their success.

Where we believe we can make a real difference is in sharing our robust manufacturing capabilities, technology and material knowledge, and by using our unique expertise to develop technically-demanding products. Together with an emphasis on lean production, innovation and value-added solutions, we work hard to ensure that we are the partner of choice for our customers, every time.

### Partnerships with a Promise

At Luvata, we deliver on our promises. We have pledged always to treat people with respect, keep an open mindset and work together with others.

Our global footprint stretches across four continents. Our diversity of locations, cultures and markets gives us access to a wealth of knowledge and expertise that continues to grow. It also means that we are local to our customers, wherever they are, so we can continue to forge the strong relationships we are known for.



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#### About Luvata

Luvata is a world leader in copper manufacturing and related engineering services. It brings together people, innovation and technology to create solutions in areas such as e-mobility, healthcare, and in electrification & the green transition. The company's success is driven by innovation, lean production and value-added sales, and its vision is to provide copper solutions which benefit people, society and the earth. Employing over 1,400 staff on four continents, Luvata works in partnership with customers such as ABB, CERN, Siemens and Toyota. Luvata is a group company of Mitsubishi Materials Corporation.



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