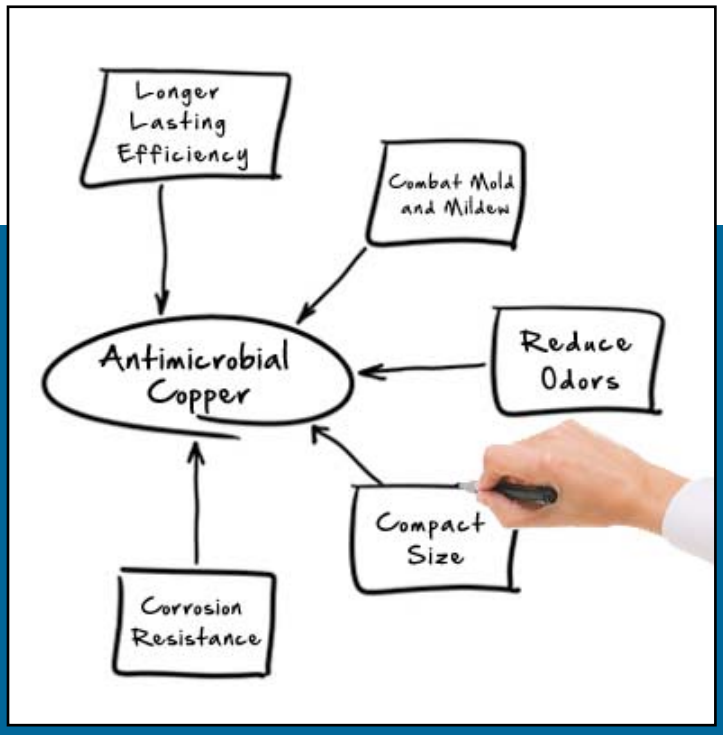
Antimicrobial Copper

all copper heat exchangers

Economical, Eco-friendly & Hygienic

... for cleaner air, longer life and efficient cooling, specify copper tubes with antimicrobial copper fins



Cu Copper Alliance

Antimicrobial All-Copper Heat Exchangers Stay Cleaner for Longer.

The benefits of using all-copper coils are already well known in the HVACR industry.

All-copper heat exchangers offer

- Longer Lasting Efficiency
- Enhanced Heat Transfer
- Odor Reduction
- Corrosion Resistance
- Reduced Refrigerant Volume
- Reduced Size

Additionally, copper metal as well as many copper alloys have remarkable intrinsic antimicrobial properties. This phenomenon has implications not only for touch surfaces but also for HVAC components.

Copper HVAC components suppress the growth of bacteria, mold and mildew that reduce system efficiency and cause product deterioration or foul odors. A U.S. EPA "Treated Article Exemption" registration for copper alloys in HVAC applications was granted in September 2010.

Compared to coils made with aluminum fins, coils made with copper fins and copper tubes stay cleaner longer, operate more efficiently and are more resistant to corrosion.

Shanghai is leading the way in investigating the use of antimicrobial copper HVAC systems on its buses.

Evaporator coils with aluminum fins were replaced by units with copper fins. The latter can reduce bacterial, fungal and viral contamination. Their surface remains cleaner for longer, offering a greatly expanded service life and contributing to an improved user environment.

Exploring the potential of these systems, the Shanghai Municipal Center for Disease Control and Prevention (SCDC) undertook testing between 2010 and 2012. Buses operating in similar conditions (e.g., time and location) were fitted with coils made with either copper or aluminum fins, and the level of contamination on each was monitored.

It was found that microbial levels on the copper surfaces were significantly lower than those on the aluminum, which concurs with a recently-published US study investigating the same subject in a laboratory environment.

Long Lasting Efficiency

All-copper coils have long been recognized for their improved corrosion resistance. Currently, all-copper coils are usually made using conventional copper tubes with diameters of 9.52 mm (or 3/8 inch = 0.375 inch). For example, they have been used in critical applications such as hospital intensive care units; and in air-conditioners on mass transportation systems, i.e., subway cars and buses.

Organic substances act as thermal insulators. If the buildup of organic contaminants can be inhibited then the fins and tubes will conduct heat more efficiently for longer periods of time. Yet, heat conduction through the fins and tubes is only part of the story. Microorganism growth also restricts airflow. Reducing the contamination keeps the passages between the fins open. Air-pressure drop across the coils remains low. Good airflow means more energy savings over the service life of the coils.

Both of these factors – conduction and convection – contribute to the overall outside-the-tube heat transfer coefficients. In real world applications, the ease of maintaining surfaces free from the microorganisms is a key factor not just for eliminating foul odors but also for economical operation.

This ground-breaking antimicrobial copper coil air handling unit will harness the antimicrobial properties of copper in hospital applications. It is made in Europe by French manufacturer Hydronic.

All-Copper Is Economical

Compared to other types of coils, all-copper coils maintain their heat-transfer efficiency over long periods of time. They are economical because they save energy.

If economics are a driver then coils made with smaller-diameter copper tubes rather than conventional-sized tubes can deliver the same cooling capacity in a smaller package. Such coils don't require as much fin material. Several leading coil makers now offer MicroGroove™ tubes for commercial applications, including all-copper coils with smaller diameter copper tubes. (See sidebar about Super Radiator Coils.)

Now, it makes sense to use copper fins in more and more applications. The reduced need for fin material keeps materials costs and system weight low. "All-copper coil with MicroGroove tubes offers manufacturers new opportunities," says Nigel Cotton, MicroGroove Global Team Leader for the Copper Alliance.

Super Radiator Coils

Recently, leading coil manufacturer Super Radiator Coils began offering all-copper heat exchangers made with small diameter copper tubes as well as copper fins; and so became one of the first companies to combine MicroGroove tubes with copper fins.

"The performance of the all-copper coil with MicroGroove tubes is outstanding," said Matt Holland, Vice President of Operations at the Richmond Division of Super Radiator Coils. "Several customers are quite interested in applying these small diameter copper tube coils in tough applications. All-copper MicroGroove coils are compact *and* antimicrobial."

The coils were developed in a world-class wind tunnel which allows for the monitoring of refrigerant temperature, pressure and flow rate under controlled conditions, while the wind tunnel is operating.

Super Radiator Coils reports that the manufacture of coils using MicroGroove technology is based on familiar manufacturing techniques. The technology can be readily applied to make coils with tube lengths up to six or eight feet in length.

"We gained a lot of experience over the last two years of development with MicroGroove," says Holland. "We have tested heat exchangers made with MicroGroove technology in our world-class wind tunnel facility in Richmond, Virginia, and we have found our customers like the results."

Founded in 1928, Super Radiator Coils (www.superradiatorcoils.com) has its headquarters offices and a manufacturing plant in Minneapolis, Minnesota. The company produces condenser, evaporator, steam and other coils for more than 20 industries, including HVAC equipment manufacturers; petrochemical producers; pharmaceuticals; pulp and paper companies; food processing, storage and display equipment.

Why Antimicrobial?

Copper and many of its alloys are used for antimicrobial touch surfaces such as door handles, hand rails, taps and light switches and there is a growing interest in antimicrobial copper for heating, ventilating and air conditioning systems.

Extensive laboratory testing sponsored by the Copper Alliance in recent years has proven that copper metal as well as many copper alloys have remarkable antimicrobial properties. This antimicrobial phenomenon has implications not only for touch surfaces but also for HVAC components such as the heat exchangers that are used in air-conditioners and refrigeration systems as well as air handlers.

Results of research have received official endorsement via the US Environmental Protection Agency "Treated Article Exemption" registration for copper alloys in HVAC applications. Granted in September 2010, the registration allows copper HVAC components to be marketed with product protection claims in the US. It can be claimed that these products suppress the growth of bacteria, mold and mildew that reduce system efficiency and cause product deterioration or foul odors.

Copper tubes and copper fins typically used in heat exchangers are 100 percent copper, which means the antimicrobial properties are at their highest for all-copper coils. Pure copper is used rather than copper alloys such as brass because unalloyed copper conducts heat better, although the antimicrobial properties are still effective with copper content of 60 percent or higher.

Bacteria, fungi and viruses can thrive on materials such as aluminum or stainless steel, which have no measured antimicrobial properties. Evidently the bacteria can form layers on these materials and become a substrate for further growth of microorganisms. However, on copper surfaces, the growth of bacteria, mold and mildew is quickly suppressed as a result of the antimicrobial properties of copper, so the surface is cleaner and easier to maintain.

More about antimicrobial copper can be found on the global website (www.antimicrobialcopper.com) dedicated to the topic.

The combination of copper fins and MicroGroove copper tubes means better corrosion resistance, more heat transfer, and longer lasting performance. *(Photograph Courtesy of Super Radiator Coils.)*

All-Copper Heat Exchangers

Along with usual use of filters and regular maintenance and cleaning, all-copper coils will harbor less microbial contamination and consequently they will conduct heat and resist corrosion better compared to other types of coil materials. The musty smells and bad odors sometimes associated with air conditioning equipment can be avoided. Heat transfer efficiency is higher for a clean heat exchanger compared to one with fins and tubes that are contaminated and so energy savings is another benefit of an all-copper coil.

"Smaller-diameter, inner-grooved copper tubes combined with copper fins are an unbeatable combination," says Nigel Cotton, MicroGroove Team Leader for the Copper Alliance. "The smaller tubes allow for the use of less fin materials and the antimicrobial copper fins also contribute to higher performance. Copper Alliance applauds the industry for its work in developing the manufacturing techniques needed to bring these superior products to the marketplace."

About the Copper Alliance

The Copper Alliance™ represents the copper industry worldwide. We are an international network of trade associations funded by the copper industry, whose common mission is to defend and grow markets for copper, based on its superior technical performance and contributions to a higher quality of life.

Visit www.microgroove.net for more information about our global network and join our discussion on LinkedIn: www.linkedin.com/groups/Microgroove-4498690.