

## *Smaller diameter copper tubes expand into large applications*

*MicroGroove Is Suitable for Coil Size from Small to Very Large*

**New York, New York (8 April 2016)** – MicroGroove technology is expanding into all sizes of heat exchanger coils from small to very large. Not many years ago there were just a handful of MicroGroove applications but that's no longer the case. MicroGroove smaller-diameter copper tubes can be found in a myriad of products, with tube lengths ranging from a few inches to several meters; and capacities ranging from hundreds of watts to hundreds of kilowatts.

MicroGroove heat exchangers enable high efficiency to be realized in diverse and dissimilar products, from cold vending machines and cold display cases to clothes drying heat pumps and mobile refrigeration systems; and MicroGroove tubes are being used in large commercial and industrial systems, too.

Once the small diameter tubes are interlaced with aluminum fin plates and mechanically expanded, the ruggedness of the round tube plate fin (RTPF) heat exchangers is remarkable. Such are highly valued for their corrosion resistance. Unlike systems made from aluminum tubes, the high nobility of copper compared to aluminum results in the sacrificial corrosion of aluminum fins rather than the copper tubes. Consequently, there is scant chance of a leak even under harsh environmental conditions. That means MicroGroove designs are favored in outdoor condensers and process cooling equipment.

### **Small MicroGroove Coils**

Amongst the smallest-sized applications are the condensers and evaporators for bottle coolers and cold display cases, especially those using R290 as a refrigerant. R290 has an ultralow Global Warming Potential value (GWP) of 3 which makes it highly desirable as a refrigerant. However, R290 is flammable, so minimizing the actual volume of refrigerant needed is a must. Smaller-diameter tubes reduce the volume of refrigerant and increase the heat transfer efficiency, making it not only possible but also economical to use propane in eco-friendly applications.

### **Midsized MicroGroove Coils**

MicroGroove tubes have been used in residential air-conditioning now for several years. For example, Spirotech makes a condenser for a two refrigeration-ton (RT) split system as well as a 1.5 RT window unit. (Note that 2 RT and 1.5 RT are equal to 7.03 kW and 5.28 kW, respectively.) The company established its MicroGroove processing line in 2012 and has been producing diverse heat exchangers ever since, including a condenser that serves as a heater for clothes dryer. Other outstanding MicroGroove products from Spirotech are an R744 gas cooler and an all-copper heat exchanger.

Lordan was one of the first companies to adopt 7-mm copper tube technology and it continues to set trends in product development with its Lord-Five (5-mm copper tube) product line. The company designs and builds coils of all sizes from the small to midsize to very large.

Heat Transfer Solutions, one of the largest producers of condenser and evaporator coils in the world, uses heavy-wall 5 mm, 7 mm, 1/4" and 5/16" diameter copper tubes in coils for countless refrigeration applications of all sizes. An example is the UL-approved Heatcraft coil for use with R744 as a refrigerant.

Super Radiator Coils also builds all sizes of heat exchangers with MicroGroove copper tubes for use with a variety of refrigerants, including propane (R290) and CO<sub>2</sub> (R744). Most recently, for an R290 air-conditioner condenser application with a capacity of 1.38 kW, copper usage was reduced up to 26 percent while increasing capacity up to 6.5 percent by using smaller diameter copper tubes.

### **Very Large MicroGroove Coils**

Companies such Lordan, LU-VE, Spirotech and Super Radiator Coils have developed expertise in the manufacture of large coils and condensers that use small-diameter copper tubes. These condensers typically are used in the air conditioning of commercial buildings or in process cooling.

LU-VE for example offers a standard line of condensers made from 5-mm coils, including three basic classes based on fan diameters of 350 mm, 500mm and 630 mm. The NanoGiant LCM 350 uses one to four fans for capacities from 9.3 to 44.0 kilowatts; LCM 500 uses one to three fans for 17.5 to 105.9 kW; and LCM 630 uses one to four fans for 24.8 to 247.2 kW.

"It is blue skies for the construction of heat exchangers for outdoor condensers using MicroGroove copper tubes," says Nigel Cotton, MicroGroove Team Leader for the International Copper Association. "In other words, heat exchanger designers just begun to tap into the potential of MicroGroove for such applications."

Reduced refrigerant volume is a very important factor considering the flammability of low-GWP refrigerants. MicroGroove helps to meet the safety codes that may be developed for such systems while not compromising on the cooling capacity. Candidate refrigerants include Low Global Warming Potential (GWP) hydrofluorocarbons (HFCs) such as HFC-32, which has a GWP of 675; and ultra-low GWP hydrofluoroolefins (HFOs), such as HFO-1234yf and HFO-1234-ze, which have GWPs of 4 and 6, respectively. Scores of refrigerants that are blends of HFCs are HFOs are also under consideration for various applications. Such refrigerant blends can be tailored to the application by making tradeoffs between performance, cost, GWP and flammability

For more information, visit [www.microgroove.net](http://www.microgroove.net). Join the MicroGroove Group on LinkedIn to share your ideas about research directions and product development.  
[www.linkedin.com/groups/Microgroove-4498690](http://www.linkedin.com/groups/Microgroove-4498690).

## **About ICA**

*The International Copper Association (ICA) leads the world's copper industry on the issues critical to securing copper's future growth. ICA's members represent a majority of global copper production, and include many of the largest copper and copper alloy fabricators. ICA's status as a not-for-profit trade association provides its members with a credible, independent advocate to address challenges faced by the collective industry. ICA increases awareness and use of copper by communicating the unique attributes that make this sustainable element an essential contributor to the formation of life, to advances in science and technology, and to a higher standard of living throughout the world.*

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