**Smaller-Diameter Copper Tubes Strengthened with Low Percentages of Alloying Elements Withstand the Higher Pressures of New Refrigerants such as R744, Says the International Copper Association**

*MicroGroove Tubes Made from New Copper Tube Alloys Provide High Strength and High Thermal Conductivity, Minimizing Wall Thickness and Materials Usage*

**New York, New York (December 23, 2014)** – According to the International Copper Association, technical tube alloys provide yet another advantage for users of MicroGroove technology, especially in ACR applications using high-pressure refrigerants such as R744 (i.e., carbon dioxide).

Refrigerants with low global warming potential (GWP) typically must operate at higher pressures, and heat exchanger coils must be designed to withstand these higher pressures. An extreme case is R744, or carbon dioxide, which has a very low GWP compared to other refrigerants, yet requires high operating pressures, particularly in the gas coolers.

Smaller-diameter tubes naturally have higher burst pressures for a given wall thickness as a direct consequence of tube mechanics. Another way to increase burst pressure without increasing tube wall thickness is to use high strength alloys of copper.

Several tube suppliers offer high-strength copper alloy tubes, which are made from alloys classified as low alloyed copper. These alloys have high thermal conductivity, excellent corrosion resistance and are easily brazed. Yet these alloys of copper with other small amounts of other metals are significantly stronger than pure copper.

**Industry Standard**

The industry standard for heat exchangers in ACR applications is C12200 Deoxidized High Phosphorus (DHP) copper. This material is nearly pure copper (99.9 percent copper) with a small percentage of the element phosphorus. C12200 has nearly the same mechanical properties as the high-purity copper alloys such as C11000.

This industry standard has excellent deep drawing characteristics and similar corrosion resistance to C11000. It provides excellent resistance to weathering and very good resistance to many chemicals. It is often used specifically for corrosion resistance. C12200 can be welded and brazed

**High Strength Alloys**

Low-alloyed copper contains small percentages of elements such as nickel, tin, iron or other metals. These alloying elements significantly strengthen the copper tubes. They accomplish this by reducing the grain size in the microstructure thus increasing the yield strength. Tube suppliers report increases in the burst pressure of 20 percent compared to C12200 for the same wall thickness.

Meanwhile, the heat transfer coefficients and pressure drops are similar to those obtained using C12200. And brazing of the high strength alloys is very similar to brazing standard alloys, so no additional training is required

“The use of high strength alloys gives manufactures more opportunities to reduce wall thicknesses, thereby saving materials and improving the energy efficiency of heat exchanger coils,” says Nigel Cotton, MicroGroove Team Leader for the International Copper Association.

“The development of high strength alloys for heat exchanger applications is highly competitive and often the alloys are proprietary to the tube suppliers.”

According to Cotton, the heat transfer efficiencies possible using high strength alloys, Internal surface enhancements and smaller diameters of tubes make MicroGroove technology the first choice for ACR applications that offer high efficiency and use eco-friendly refrigerants. Familiar manufacturing processes and excellent durability are bonuses.

For more information about high strength tube alloys, contact tube supplier members of the Copper Alliance listed on [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, Ltd. (ICA) is the leading organization for promoting the use of copper worldwide. ICA’s mission is to promote the 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 worldwide. Visit [www.copperinfo.com](http://www.copperinfo.com) for more information about ICA.

# # #