Manufacturing MicroGroove Copper Tubes

Copper tubes are produced by a number of different processes, but they all allow efficient and economical production of sizes from very large to very small diameters. For air conditioning and refrigeration applications, the tubes are provided with inner surface enhancements to increase the surface area. Rifling or grooving the inside of the tube helps to mix the refrigerant, homogenizes the refrigerant temperature across any tube section and improves heat transfer performance. Reducing the diameter of the tube contributes to the mixing or refrigerant turbulence, further improving heat transfer.

Existing air-conditioner coils comprised of round copper tubes and aluminum fins (CTAF coils) typically are mechanically assembled using tube expansion. MicroGroove copper tubes also can be assembled using tube expansion with minor modifications to the expansion tube.

A modest reduction in tube diameter increases cooling rates.

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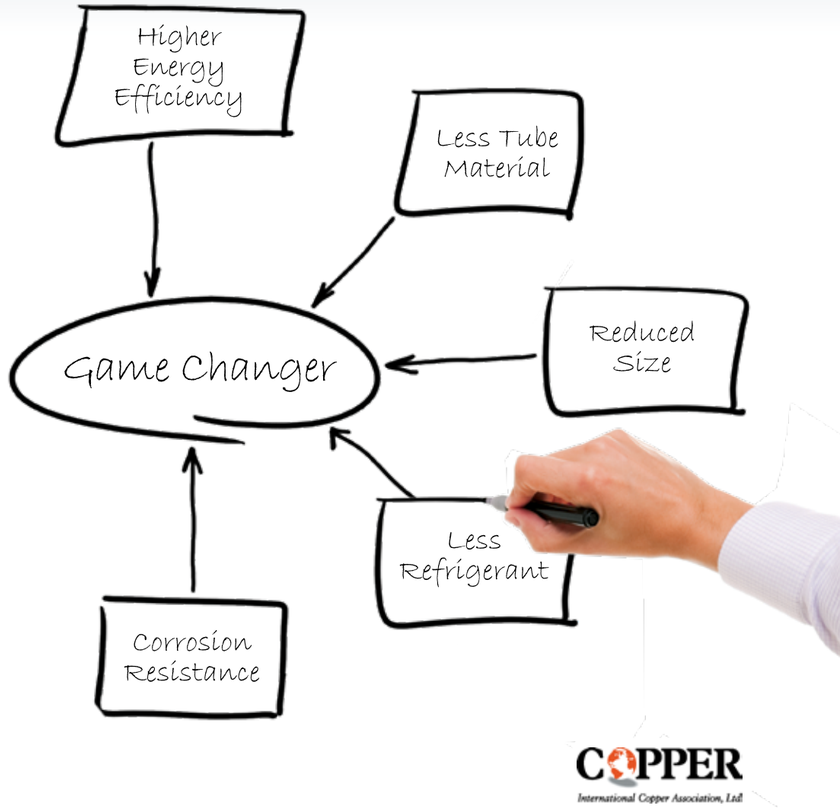
the microgroove™ advantage



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Copper Tubes are the HVAC Industry Standard for a Reason

Condenser and evaporator coils with round copper tubes and aluminum fin have been a winning combination in the HVAC industry for many years. Manufacturers appreciate the assembly advantages provided by these components, and technicians find it easy to join and repair copper tubing in the field. More importantly, this well established technology has a proven record of durability and a high level of customer satisfaction.

Demands for lower costing, energy efficient, environmentally friendly alternatives have moved the copper tube industry toward tubing that is smaller in diameter. The advantages of smaller tubes include higher heat transfer, less refrigerant and smaller unit size.

Copper tube offers many advantages such as recyclability, sustainability, durability, corrosion resistance, and familiar manufacturing processes.

Overall Benefits of Economical, Eco-friendly MicroGroove Copper Tubes

Demands for reduced raw materials costs and the use of environmentally friendlier refrigerants have been the impetus for heat exchanger designs that are based on smaller diameter copper tubes. Reducing the tube diameter achieves weight and material cost reductions, increases compatibility with new refrigerants, and increases energy efficiency, all without compromising quality. In addition, the advantages of using copper — familiar manufacturing processes, recyclability, sustainability, durability and corrosion resistance — are maintained.

Energy efficiency and reduced overall system size can be achieved at a lower material cost with smaller diameter tubes. Smaller tubes result in reduced usage of tube materials, fin materials and refrigerants, contributing to overall reduction in system cost.

MicroGroove technology allows for higher heat transfer efficiency because the refrigerant flow is closer to the tube wall as the tube diameter decreases

MicroGroove Copper Tubes Equal Increased Heat Transfer

The goal in residential and commercial air conditioner design and manufacture is to reduce cost and increase energy efficiency. Copper is a means for achieving that goal.

Smaller diameter tubes allow for higher heat transfer efficiency because the refrigerant flow is closer to the tube wall than it is in larger diameter tubes. Because smaller diameter tubes can be designed with a higher "heat transfer coefficient," they can achieve the same performance as larger diameter tubes with less tube and less fin.

MicroGroove Copper Tubes Work Well Under High Pressure

The inherent strength of smaller diameter tubes is an advantage, especially in light of the higher pressure requirements of modern refrigerants. Although the number of tubes in an evaporator or condenser is likely to increase with smaller diameter tubes, potential increases in weight can be offset by more compact coils resulting from higher heat transfer efficiency.

Fin Designs for MicroGroove Copper Tubes

Fins can be made from aluminum or copper. In either case, less fin material is required for coils with small diameter copper tubes compared to larger diameter tubes. Since less fin material is required, copper fins are an attractive alternative fin material, providing advantages with regard to corrosion resistance.