

Copper is Well-Suited for Eco-Friendly Refrigerants, Says the International Copper Association

Manufacturing Infrastructure Adapts to Smaller-Diameter, Inner-Grooved MicroGroove Copper Tubes and Coils as Industry Transitions to Low-GWP Refrigerants

New York, New York (April 22, 2015) – According to the International Copper Association, heat exchangers made with copper tubes are proving to be highly compatible with most of the eco-friendly refrigerants under consideration for refrigeration systems, air conditioners and heat pumps globally.

“In both laboratory and manufacturing environments, smaller-diameter copper tubes are proving to be a good match for eco-friendly refrigerants,” says Nigel Cotton, MicroGroove Team Leader for the International Copper Association.

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.

“Traditional copper tubes with plate-fins are well suited for these new blends of eco-friendly refrigerants,” says Cotton. “The use of smaller-diameter tubes further reduces the effective GWP in applications since less refrigerant charge delivers the same capacity.” Copper also excels when used in heat exchangers for natural refrigerants, including hydrocarbons (e.g., propane, R290) as well as carbon dioxide (R744).

According to the laws of mechanics, the “hoop stress” exerted on a tube decreases with diameter (when pressure and wall thickness are held constant). Consequently, higher pressures can be applied without increasing the wall thickness or lower wall thicknesses can be used. “When manufacturers use smaller-diameter copper tube, they can save on materials and increase performance in more ways than one,” says Cotton.

Manufacturing Infrastructure

Fortunately, the development of smaller-diameter copper tubes and the manufacturing technology for the production of MicroGroove heat exchanger coils coincides with the regulatory need. “MicroGroove technology has been steadily advancing,” says Cotton. He explains that the manufacturing infrastructure for supplying evaporators, condensers and gas coolers to the industry has developed to the point where it is available for use.

“For OEMs who want to use smaller diameter copper tubes, the equipment is available,” says Cotton. “MicroGroove is the option of choice for Low-GWP and ultra-low GWP refrigerants and refrigerant blends.”

The Copper Alliance recently provided a webinar presented by Brian McConnell, President of Burr OAK Tool Inc., in which the manufacturing technology to produce heat exchanger coils from MicroGroove copper tubes was described. According to experts at Burr OAK Tool, the equipment to build small diameter tubes into all sizes of coils is already available, and manufacturing processes are familiar, economical and reliable.

For more information, visit 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.

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 for more information about ICA.

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