

Copper is at Center of HVAC Design Renaissance

Researchers Look toward Copper and Brass to Reduce HVAC Odors and Make Units More Efficient

Many of us couldn't imagine life without air-conditioning. It's everywhere we go. Usually we don't even notice when it's not there. Enormous heating, ventilation and air-conditioning (HVAC) plants cool our classrooms and offices, smaller central air conditioning systems and window units chill our homes and even more compact systems create a comfortable climate in our vehicles.

Not surprisingly, there is intense pressure on HVAC designers to develop more efficient equipment. Researchers are discovering new ways to increase the efficiency of the heat exchangers while also eliminating something we can all do without, namely, foul odors.

Get the Smell Out

The choice of HVAC materials can affect the odors that emanate from the system. Dark, moist environments breed bacteria and fungi that are widely recognized causes of foul odors and reduced efficiency of HVAC systems.

Copper and its alloys like brass and bronze may offer a decided advantage compared to other HVAC materials because of their outstanding antimicrobial properties. Especially in components being replaced with copper are those in which microbial contaminants tend to thrive—cooling coils, heat exchange fins and drip pans. Antimicrobial copper mitigates the growth of these organisms.

To study this effect, the U.S. Department of Defense is funding HVAC research in the military barracks at Fort Jackson in Columbia, South Carolina. The aim of this real-world research is to better understand how copper can improve HVAC function, because the microbes are not only the source of foul odors, but they also build up on heat transfer surfaces and compromise the thermal efficiency of the unit.

Charles Feigley, Ph.D., Professor of Environmental Health Sciences at the University of South Carolina is the principal investigator for the study. He explains, "Improvements in building and construction methods have generally led to increased energy efficiency, but at the same time, these 'tighter' building envelopes tend to trap bacteria, leading to odors. The results of this real-world trial should encourage advancements in the design of HVAC systems."

Besides the real-world field trial at Fort Jackson, a controlled laboratory study is underway at the University of South Carolina in the Arnold School of Public Health. Here, the HVAC system is being broken down into clear distinct components to determine where the use of copper alloys will have the most cost-beneficial effects on thermal efficiency and odor control improvements. In addition to the trials, the Copper Development Association is pursuing U.S. Environmental Protection Agency (EPA) registration of copper alloys for use in protecting HVAC components.

A Design Renaissance

Change is not new to HVAC designers. In the past, key refrigerants have been banned because of their high ozone depleting potential (ODP) and even today some are being phased out because of their global warming potential (GWP).

The evolution continues. The shape of the next generation of heat exchangers is a topic of great excitement in the design community. Although the exact designs, cooling fluids and end-uses are still works in progress, one thing is certain: Copper alloys are at the center of a renaissance in the design of HVAC systems.