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Copper, brass, bronze – choose your weapon in the fight against infection

The increasing threat from microorganisms, be it swine flu or superbugs, is highlighting the role touch surfaces have in the transmission of infection and the role antimicrobial materials have to play in helping to curb the spread of disease.

Copper has been proven to be a broad spectrum antimicrobial, effective against the headline-making organisms threatening public health today – MRSA, E. coli, Influenza A and Clostridium difficile.

Laboratory testing, clinical trial results and the stringent testing carried out to satisfy the US Environmental Protection Agency, provide a solid body of scientific evidence which has been peer reviewed and published. Now designers and architects are starting to consider how to harness this inherent property of copper to design out infection in critical environments such as hospitals and care homes, where touch surfaces can act as reservoirs for dangerous germs.

While copper is the active element with the antimicrobial effect, most touch surface applications require enhanced mechanical properties such as strength and wear resistance and these can be provided by one of the families of copper alloys. Copper combines readily with a range of alloying elements to form brasses, bronzes, nickel silvers and copper-nickels, each of these being generic terms for alloy families. Specific alloys are classified by EN material designations with defined compositional and property ranges. Copper alloys are easy to work with and form into different shapes so designs can be readily realised.

The copper alloy system not only provides a range of antimicrobial materials with different combinations of mechanical properties suited to different end uses but also a palette of colours: from the rich reds of the high coppers through the warm golden-yellows of the brasses to the silvery-whites of the nickel silvers. These choices can help designers create a warmer, more soothing, healing environment.

The kind of interior elements and products that could benefit from copper's antimicrobial properties include worktops, banister rails, lift interiors (particularly control panels), door

handles and push plates, bathroom fittings such as taps, grab rails and even toilet seats. The antimicrobial properties are intrinsic to the metal so last the lifetime of the product, even if subject to knocking and scratching, and offer continuous protection against disease-causing bacteria. At end of life, products are 100% recyclable and so contribute towards sustainable design.

In laboratory tests carried out at the University of Southampton, a range of alloys with varying copper contents has been tested against a long list of pathogens, using stainless steel, the ubiquitous healthcare material, as a control. Results of these tests show that killing times are faster with higher copper contents (greater than 60%) and that organisms survive on stainless steel for hours and even days. In the US, independent laboratory testing led to the registration in February 2008 of over 300 copper alloys which can kill 99.9% of specified bacteria, (including MRSA and E.coli) within 2 hours, even after repeated contamination with extraordinarily high challenges.

For copper alloys to retain their antimicrobial efficacy, their surfaces must not be oiled, painted, waxed, lacquered or coated in any way. Surfaces should be cleaned as per standard procedures. Any natural oxidation that occurs to these active surfaces under these circumstances does not impair their antimicrobial efficacy.

A choice of 300 alloys may seem mind boggling so, to simplify matters, designations, compositions and colours of some of the most commonly available alloys are given below.

Alloy family	EN Designation	Cu	Zn	Sn	Ni	P
Bronze	CW451K	95		5		0.2
Copper-nickel	CW352H	90			10	
Brass	CW505L	70	30			
Nickel silver	CW409J	65	17		18	

Copper Development Association is working with material suppliers to support designers and architects through the provision of information via their website, www.copperinfo.co.uk. To help specifiers appreciate the aesthetics of these remarkable materials CDA is offering architects and designers credit-card sized wallets of sample alloys, kindly provided by Aurubis UK Ltd and KME UK Ltd and cut to size by W S Allely Ltd. To request a free sample set, contact helpline@copperdev.co.uk.

So, while hand hygiene is the number one measure to prevent the spread of disease in the community and in our hospitals, it is recognised that even among healthcare workers compliance rates are less than satisfactory. Copper touch surfaces, which effectively self-disinfect between cleans, can help to reduce the risk of infection. Copper alloys provide a range of materials with proven, durable antimicrobial efficacy, for improving hygiene in the built environment.



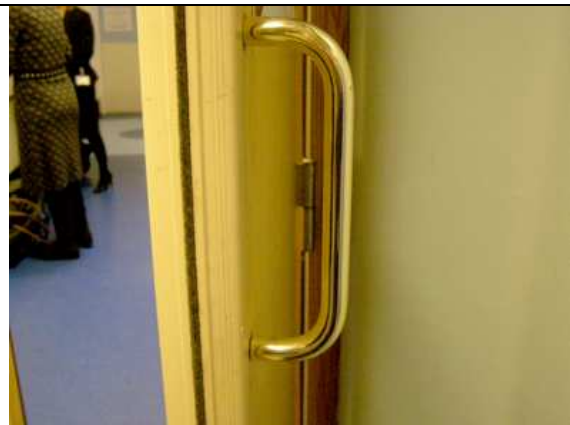
Copper alloys used in interior design



Copper alloy stair rail



Copper alloy door furniture and dressing trolley in use at Selly Oak Hospital



Copper alloy door furniture installed in Selly Oak Hospital, Birmingham

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