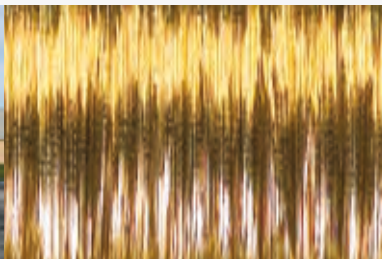


UNIGUARD™

New alloy addresses
formicary corrosion

Based on independent laboratory testing, Luvata UNIGUARD™ alloy has been shown to be an effective solution against formicary corrosion. UNIGUARD is available with all advanced heat transfer surfaces that are supplied using Luvata's state-of-the-art "roll-and-weld" process and it is compatible with traditional ACR heat exchanger manufacturing processes.



About Luvata

Luvata is a world leader in metal fabrication, component manufacturing and related engineering and design services. We are committed to partnering with our customers to help them increase their competitiveness. Our products and services enable our customers to improve operational efficiency, improve products and reduce tied-up capital. Because we focus on our customers' results and are unfailingly reliable, we are the partner on which our customers base their future development.

Copper tube – Aluminum fin, Coils

Copper tube - Aluminum plate fin coils, used for over 70 years, are the most reliable, easily repairable, and highest performance coils on the market. These coils consist of a round copper tube and flat plate fin design. Over the years, a variety of tube enhancements, fin designs, and fin spacings have been employed to improve heat transfer. These type of coils utilize existing equipment that OEM's have on hand, require no new capital investment, and have proven to last for decades. However, starting in the 1990's there has been an increasing problem with a certain kind of corrosion.

Formicary – Drivers to recent awareness

In recent years the number of complaints for leaks has been increasing in the indoor coils of vented AC systems, the primary form of cooling in the US residential market. Further study has indicated the cause in more than half of the heat exchanger coil failures was formicary corrosion. Longer warranty periods, and higher sensitivity to refrigerant leaks, are some factors leading to increased awareness. Tighter homes, different types of building materials, and other factors are contributing to the increased occurrence of formicary corrosion.

Formicary Corrosion – What is it?

Formicary ("Ants Nest") corrosion has a unique morphology that appears as a wandering pit (see 122 alloy photomicrograph below). Pits are not observable to the un-aided eye. This type of corrosion only occurs in copper based alloys and in the presence of organic acids, moisture, and oxygen.

UNIGUARD alloy – Independent Testing*

Luvata has worked in cooperation with a leading 3rd party lab since 2001. This lab has developed the industry standard, accelerated formicary corrosion test. UNIGUARD (4221) alloy was found to be at least 25 times more effective against formicary corrosion than the standard DHP (CA122) alloy.

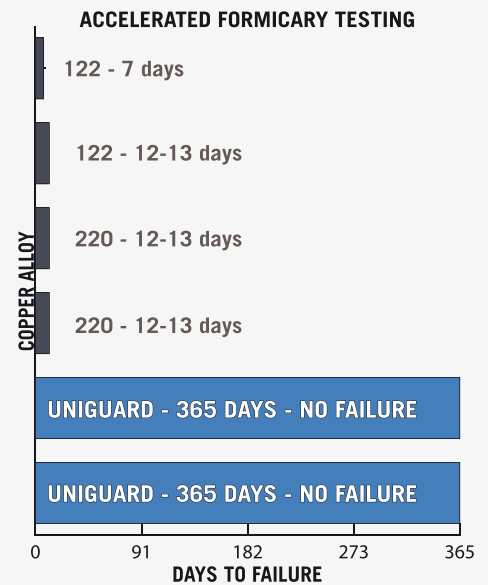
More information – UNIGUARD alloy

Brazing success has been achieved in all applications. It is common that lower brazing temperatures or some additional fluxing is required. Examples include using gas flux with the torch head, a flux core braze alloy ring, or lowering the brazing temperature through a furnace. UNIGUARD is patent pending, for use in corrosion resistant tubes, and available in TIAC™ and hairpin form.

Alloy composition table

Alloy	Cu	Pb	Fe	Sn	Zn	P
122	Rem					0.015-0.040
220	89.0-91.0	0.05 Max	0.05 Max		Rem	
UNIGUARD	86.0-89.0	0.01 Max	0.035 Max	1.1-1.6	Rem	.001-.010

*This paper is not intended to warrant or guaranty any specific level of performance, which can vary greatly depending on the field conditions in which UNIGUARD tubing is used. Please contact your Luvata representative for further information.

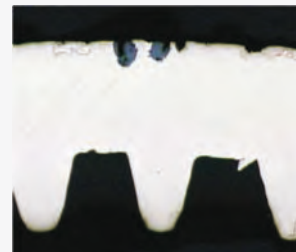


122 ALLOY



122 Alloy sample 125x magnification. Mounted after 7 days with failure, of accelerated formicary corrosion testing.

UNIGUARD



UNIGUARD sample 125x magnification. Mounted after 180 days of accelerated formicary corrosion testing, with no through the wall failure.