THE BASICS OF ELECTROCHEMISTRY & MICROCLIMATES

Due to a phenomenon known as Galvanic Corrosion (also known as bi-metallic corrosion) some metals commonly used as flashing materials can cause accelerated corrosion when used with in conjunction with Unicote®, Unicote® LUX, Colorcote®, Magnaflow® and Unizinc®. Corrosion of coated steels can occur when these products are placed in direct contact with each other.

This Galvanic corrosion is a function of electrochemistry, with materials known as anodes and cathodes preferentially corroding. This is also known as sacrificial corrosion.

This list below rates metals from least reactive (more inert), to most reactive, with the metals at the bottom of the list corroding preferentially compared to those above them.

For example, Zinc will always corrode preferentially when placed in Carbon steel. This is the basis for the galvanising process to protect steels from corrosion and enhance service life.

Whilst the application of galvanic corrosion theory can be used to protect materials from accelerated weathering, it is also critical in determining which materials can be placed in direct contact with each other. Flashing and fastener materials are of particular interest, and must be compatible with adjoining materials to minimise any issues with dissimilar metals.

Gold
Platinum
Titanium
Graphite
Silver
Stainless Steel
Nickel
Copper
Brass
Carbon Steel
Aluminium
Zinc

The Table below shows the compatibility of dissimilar metals when placed in contact with each other (via flashings, fasteners and roof sheeting).

	Accessory or Fastener material					
Cladding Material	Stainless Steel	Zinc Coated Steel & Zinc	Al-Zn Coated Steel	Aluminium	Copper & Brass	Lead
Zinc Coated Steel & Zinc	No	Yes	Yes	Yes	No	Yes
Al-Zn Coated Steel	No	Yes	Yes	Yes	No	No
UniCote®, UniCote® LUX	No	Yes	Yes	Yes	No	No
Magnaflow®, Colorcote®	No	Yes	Yes	Yes	No	No
Aluminium	No	Yes	Yes	Yes	No	No
Stainless Steel	Yes	No	No	No	No	No

Inert Catchments

A very specific example of the application of electrochemistry is found in the phenomenon known as inert catchments.

Roofing which does not change the quality or nature of rainwater as it flows across the roof is referred to as inert catchment. These catchments may be UniCote®, terracotta tiles, sealed concrete tiles, acrylic sheeting, glass, UniZinc®, or Aluminium. Inert roofing materials do little to change the chemical nature of the water run-off. This means that rainwater with any chlorides or acids dissolved in it from the atmosphere can flow into the gutter and downpipe.

In general, unpolluted rainwater has a pH of less than 6, which is slightly acidic.

This is due to naturally occurring carbon dioxide in the atmosphere reacting with the water vapour to lower the pH. Rainwater near the coast can pick up chlorides from salt air due o turbulence of the surf prior to precipitation, and overnight condensation can be similarly affected. When slightly acidic rain falls on a large catchment area, such as a roof, it is collected and directed in concentrated streams, following the roofing profile. If the materials at any point in the catchment system are susceptible to unpolluted rainwater or acid rain, corrosion is likely to occur.

The material most commonly affected in such situations is unpainted galvanized steel, and this is of particular concern downstream from an inert catchment area.

Examples of common inert catchment situations include:

- UniCote® steel roofing with galvanized steel gutters and downpipes.
- UniZinc® steel roofing with galvanized steel gutters and downpipes.
- Pre-Painted galvanized steel roofing with galvanized steel gutters.