BLACKLABEL
THE WORLD'S BEST WOOD

TECHNICAL BULLETIN

Galvanic Reaction Between Metals

Galvanic Corrosion

When two different metals come into electrical contact with a conductive liquid like rainwater or groundwater, galvanic corrosion can occur. This happens when a metal atom loses electrons and becomes oxidized, transferring these electrons to another site. The location where electrons are lost is known as the anode, while the site receiving the electrons is the cathode. Considering galvanic corrosion is vital when selecting metal paneling, trim, joist hangers, and fasteners.

Reducing Galvanic Corrosion

To mitigate galvanic corrosion, use similar metals. Metals that are close to each other in the Galvanic Series generally do not significantly affect each other, while those farther apart have a more significant corrosive impact on the more active metal. Ensure dissimilar metals are not connected by water. Avoid situations where small anodes contact large cathodes, as corrosion rates depend on the surface area ratio between anode and cathode. A smaller anode relative to the cathode accelerates corrosion due to a concentrated electron flow, while a larger anode slows it down by spreading the electron flow.

Using a protective metallic coating, or sacrificial coating, provides galvanic protection when the coating is more anodic than the base metal. The anodic material will corrode when the base metal is exposed, and the thickness of the coating determines its protective effectiveness. Non-sacrificial metallic coatings, paint coatings, plastic, or other non-metallic barriers can also reduce galvanic corrosion significantly. However, if using a paint coating, be aware that any scratch exposing the base metal could lead to rapid corrosion if the base metal becomes the anode in contact with a dissimilar metal with a larger surface area.

Preventing Corrosion in Fasteners

When dealing with metal fasteners like bolts, screws, and welds, galvanic corrosion is a significant issue. Fasteners generally have a smaller surface area than the materials they secure, meaning that if they act as the anode, they are prone to quick corrosion. To avoid this, ensure that the fastener's surface metal matches the metal it will be fastening. The ideal scenario is having a large anode paired with a small cathode. Therefore, bolts and screws should be made of metal that is less prone to corrosion or more cathodic.

20807 Biscayne Blvd, unit 304. Aventura, FL 33180
Phone: **1-888-341-5517** | Website: **www.BlackLabelWood.com** | Email: **info@BlackLabelWood.com**

TIMBER TRUST COMPLIANCE

Use the following chart to guide your choice of fasteners based on their galvanic action:

Base Metal	Fastener Metal					
	Zinc & Galvanized Steel	Aluminum & Aluminum Alloys	Steel & Cast Iron	Brasses, Copper, Bronzes, Monel	Martensitic Stainless (Type 410)	Austenitic Stainless Steel (Type 302/304, 303, 305)
Zinc & Galvanized Steel	A	B	B	C	C	C
Aluminum & Aluminum Alloys	A	A	B	C	Not Recommended	B
Steel & Cast Iron	AD	A	A	C	C	B
Terne (Lead Tin) Plated Steel Sheets	ADE	AE	AE	C	C	B
Brasses, Copper, Bronzes, Monel	ADE	AE	AE	A	A	B
Ferritic Stainless Steel (Type 430)	ADE	AE	AE	A	A	A
Austenitic Stainless Steel (Type 302/304)	ADE	AE	AE	AE	A	A

Key:
A: Corrosion of the base metal is not increased by the fastener.
B: Corrosion of the base metal is marginally increased by the fastener.
C: Corrosion of the base metal may be markedly increased by the fastener material.
D: Plating on the fasteners is rapidly consumed, leaving the bare fastener metal.
E: Corrosion of the fastener is increased by the base metal.

Corrosion of Panels and Trim in Contact with Treated Wood

Avoid direct contact between aluminum, aluminum-coated, and galvalume-coated parts with wood preservatives that have copper, mercury, or fluorides. Do not let bare metal panels touch treated lumber in areas where condensation often forms on the metal in contact with the lumber or where the wood treatment is more noble than the metal. Ensure a suitable barrier is used to separate metal components from treated lumber.

20807 Biscayne Blvd, unit 304. Aventura, FL 33180
Phone: **1-888-341-5517** | Website: **www.BlackLabelWood.com** | Email: **info@BlackLabelWood.com**

TIMBER TRUST COMPLIANCE