

Q A client asked me to install copper gutters on a house with aluminum-clad fascia trim. Will there be a problem between the dissimilar metals reacting?

A Harrison McCampbell, a forensic architect from Brentwood, Tenn., responds: When different types of metal come into direct contact with one another, you're setting the table for possible corrosion between the two. The speed at which that occurs, along with the amount of corrosion (both visually and structurally), depends on the metals involved. In this example, if you install copper gutters on a house that had been built with aluminum gutters, trim, and fascia, the less-reactive copper may cause damage to the more-reactive aluminum.

A technical explanation of the process is that metals contain atoms and ions that may provide negatively-charged anodes (known as anodic) or positively-charged cathodes (known as cathodic). When two different metals come in contact in the

presence of an electrolyte—in this case, water—a small electric path moves from anodic (more-reactive metal) to cathodic (less-reactive metal). Over time, this electron transfer leads to degradation or corrosion of the anodic metal while the cathodic metal stays relatively unaffected. Looking at the chart below (based on a chart at solarprofessional.com), you can get an idea of how different metals used in construction compare to one another in regards to their level of galvanic activity.

As a general rule, it is probably good to physically separate different metals, just to be safe. That separation, or isolation, can be done with paint (although metals rubbing together over the years might cause paint to wear off), with some sort of plastic film (which might become brittle and deteriorate over time), or with a self-adhering rubber or asphalt-based membrane (such as Protecto Wrap flashing tape; protectowrap.com). These self-adhering membranes can be found in most residential construction supply houses. Also keep in mind that even if one of the metals involved has factory-applied paint, the ends and edges of the metal can be difficult places to maintain any protection.

I often see buildings with prepainted vertical metal siding in direct contact with galvanized counterflashing, and rust forming on the counterflashing. That is because the galvanizing itself is metal and it's reacting negatively with the siding, which is a different metal. Most likely, cyclical and differential movement have rubbed the finish off the siding at those places where adjacent panels meet. The newly-exposed metal in the siding consequently attacks the galvanized finish of the counterflashing at each of these locations.

Time and water are always the culprits with galvanic reactions. Adding a protective coating like paint to metal can forestall corrosion, but in your case, installing aluminum rather than copper gutters might better reduce the risk of corrosion.

This chart lists common metals in order of how reactive they are with other metals. The greater the distance between two metals on the chart, the greater the potential for corrosion when they're in contact.

Galvanic Series Chart		
Anode (-)	Active	Magnesium
	(most susceptible to corrosive attack)	Zinc
Electrical current/movement of ions	Direction of attack	Galvanized Steel
		Aluminum
		Mild Steel
		Cast Iron
		Lead
		Brass
		Copper
		Bronze
		Monel
		Nickel
		Stainless Steel 304
		Stainless Steel 316
		Silver
		Titanium
		Gold
Cathode (+)	Noble	Graphite
	(least susceptible to corrosive attack)	Platinum