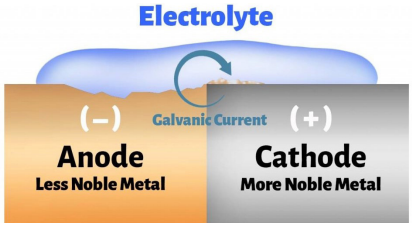

Datasheet Galvanic corrosion

For the mounting of solar PV-panels it is of highest importance, that the connections made in the construction are strong enough to deal with the high wind- and snow loads during the lifetime of the installation. For this reason, the use of metal components, profiles and fastening materials is eminent. In most installations a combination of metals, like fastening materials in stainless steel (AISI 304) with aluminium profiles and components is applied. This combination of metals is a standard in the global solar industry.

However, when two dissimilar metals are in connected and a so-called “electrolyte” is present, a phenomenon called “galvanic corrosion” may occur over time. In this document, we want to give a further explanation on this phenomenon and influence on specific combinations of metals, that are common in mounting constructions for PV-panels.

The process of galvanic corrosion

Galvanic corrosion between two metal will occur only when:

- the metals and alloys have different electrode potentials, which will result in one of the metals to behave like an “anode” and the other as “cathode”;
- there is a conductor between the two metals;
- an electrolyte (moist electrical conductor) is present, for example: water or condensation.

Ratio anode/cathode

When galvanic corrosion occurs, the mass of metal of the anode (= metal with the lower potential) will reduce, while the mass of the cathode (= metal with the high potential) will increase.

It is therefore important that the smaller component of the connected metals is the cathode. This reduces the effect of the galvanic corrosion. In practice: an aluminium plate (anode / larger surface) that is mounted with stainless steel screws (cathode / smaller surface) will last longer compared to a stainless steel plate mounted with aluminium screws. The table below shows some of the most common metal combinations and the expected effect of galvanic corrosion:

Material to be mounted	Material of fastener (bolts / nuts / screws / rivets / etc.)			
	Galvanized steel	Aluminium	Austenitc stainless steel (AISI 302/304)	Martensitic stainless steel (AISI 410)
Galvanized steel				
Steel				
Aluminium				
Copper				
Austenitc stainless steel (AISI 302/304)				
Ferritic stainless steel (AISI 430)				

	Corrosion of the mounted materials is not affected by the material of the fasteners.
	Corrosion of the mounted materials is not affected. The post-treatment of the fastner material is affected, so that bare metal remains.
	Corrosion of the mounted materials is only slightly increased by the fastening materials.
	Corrosion of the mounted materials can be considerably increased by the fastnening materials.
	Corrosion of the mounted materials is not affected. Corrosion of the fastening materials is increased by the mounted materials.
	Not recommended.

Table 1: Expected effect of galvanic corrosion for most common metal joint combinations.

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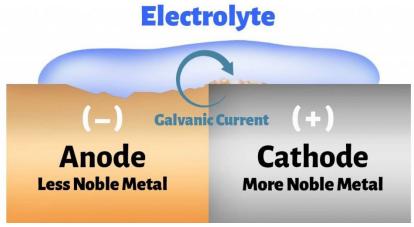

Datasheet Galvanic corrosion

Isolator

In case there is an isolator present between the two metals (for example: a coating or anodized layer), there is no direct connection between the metals and galvanic corrosion will not occur.

Experiences in practice

Van der Valk Systems has more than 50 years of experience with construction and mounting materials in the horticultural industry and more than 10 years in the solar industry. In the design phase of new products and systems, the risk of galvanic corrosion is always considered and minimized for the materials selected.

Additional testing

Van der Valk Solar Systems performs tests with existing and new products on a regular basis, in order to guarantee the strength performance and corrosion resistance. Examples are the so-called “salt-spray tests”, tests in climate chambers and strength tests. The results of these test show that the applied combination of metals in our products have a very low risk of galvanic corrosion. Additionally the minimal galvanic corrosion that may occur will not have any negative effect on the functionality nor the strength of the construction, during the lifetime that can be expected of the systems.

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