Tech Data

Minimizing Galvanic Corrosion

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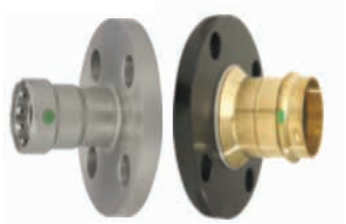
Galvanic corrosion (or bimetallic corrosion) is the process where dissimilar metals in direct contact with one another and an electrolyte corrode or oxidize. The metals corrode by creating an electrochemical path which allows metal ions to move from one metal (anode) to the other metal (cathode). The rate and severity of corrosion depends on the strength of the electrolyte, the difference in electrical potential (or position in annodic index) between the metals and the relative size of anode compared to the cathode.

Material selection and material transitions are the responsibility of the design engineer. The following are general guidelines for reference only.

Electrical separation or transition fittings are not necessary between copper and most copper alloys like brass and bronze. Similar grades of stainless steel connected together, e.g., 304 and 316, do not require electrical separation. Dry systems installed indoors do not typically require electrical separation between dissimilar metals because there is no electrolyte present, but can experience moderate galvanic corrosion in humid or corrosive environments.

When connecting copper to carbon steel or galvanized steel, flanges or dielectric unions should be used to electrically insulate each material. When connecting copper to stainless steel, a brass or bronze fitting between the two metals provides sufficient electrical separation in most environments.

The relative size of dissimilar metals also affects galvanic corrosion. A small, more noble (cathode) component in a system is usually acceptable. For example, stainless steel or brass valves are often used in carbon steel pipelines with no adverse affects.

Pipe Material	Flanges	Dielectric Unions	Threaded Adapters
Carbon steel to copper			Not Recommended
Stainless steel to copper			
Carbon steel to stainless steel			 Application Specific

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