

from experience

Dielectric Fittings in Utility and Process Piping

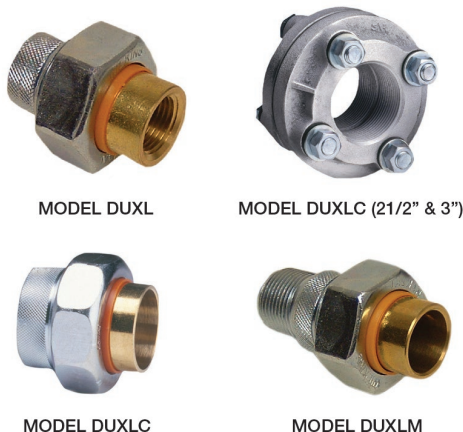
Whenever there is a transition between two dissimilar metals along with the presence of water or other electrolytes, galvanic corrosion can be a concern. The presence of water allows the difference in electromotive force between the metals to form an extremely weak electrical circuit, with the less noble metal experiencing localized corrosion and possible premature failure at the point of connection (see Experience in Brief).

In food plants, utility piping is typically constructed of copper or carbon steel pipe, which then transitions to stainless steel pipe or tube before entering GMP areas. Because food plant lines frequently contain water (even “glycol” lines), the combination of the dissimilar metals and the presence of water makes these lines inherently susceptible to galvanic corrosion. Therefore, special design considerations are required.

The most common way to prevent galvanic corrosion at utility pipe transitions is to install dielectric fittings. These fittings form an insulating barrier that prevents the flow of electricity between the dissimilar metals. This insulation barrier, which breaks the galvanic corrosion cycle and prevents corrosion from occurring, is constructed of a non-conducting material, such as plastic or non-conductive gasket. In addition, the two metals must be completely separated to work properly: Simply wrapping pipe threads with Teflon tape may not provide the protection needed, and, if used, the level of protection achieved may vary widely. Manufactured dielectric fittings eliminate this variability, although it is still important to use experienced installers.

Note also that dielectric fittings will interrupt desirable pipe system grounding. If pipe must be grounded, the engineered system should ensure that lines separated by the dielectric fittings are independently bonded to the grounding grid.

Protection from galvanic corrosion needs to be addressed during any new installations, system modifications or repairs. The proper use and installation of proper dielectric fittings will mitigate the risk of galvanic corrosion and help piping systems achieve their anticipated life expectancy.



Dielectric pipe fittings. Source: Zurn Industries, LLC

experience in brief

- CORRODED END**
 (Anodic or less noble)
 Magnesium
 Zinc
 Aluminum
 Steel
 Lead
 Tin
 Nickel
 Brass
 Bronzes
 Copper
 Stainless Steel (passive)
 Silver
 Gold
 Platinum
 (Cathodic or more noble)
PROTECTED END

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