

Tech Note 33: Bimetallic Corrosion

TN.33

Applicable Products:

- All metal based products, drainage & press-fit

Related Documents:

- Tech Note TN.04 Insulation & Stainless Steel (Lagging)
- Tech Note TN.20 Brackets & Supports

Mixing different metals is best avoided in general however, in situations where this cannot be achieved the metal types must be assessed for their potential to react (ie, in the presence of water). The process, galvanic corrosion, is also known as bimetallic or dissimilar metal corrosion. Water may be the internal liquid and/or external moisture such as condensation or rainfall can act as the electrolyte.

There are many charts available to assess the behaviour of how different metals interact when in contact (such as bolt and flange combinations). The following chart shows common material situations from a water flow (direction) aspect and must be considered. The direction of flow with pipework includes the possibility of material from the upstream pipe material flowing into and contaminating the second downstream pipe material.

As such, ensure the design flow direction is maintained as no flow (still) or negative flow situations may change the suitability. Designs should consider the use of a compatible non-return valve between different materials of pipes to prevent this occurring.

		Flow To						
		Stainless 316	CuNi 90/10*	Copper	Brass'	Cast Iron & Steel	Galv (Zinc)	Aluminium
Flow From	Stainless 316	OK	OK	OK	OK	X	X	X
	CuNi 90/10*	OK	OK	OK	SEP	X	X	X
	Copper	OK	SEP	OK	OK	X	X	X
	Brass'	OK	OK	OK	OK	X	X	X
	Cast Iron & Steel	SEP	X	SEP	X	OK (X for Steel)	X	X
	Galv (Zinc)	SEP	SEP	SEP	SEP	OK	OK	SEP
	Aluminium	SEP	SEP	SEP	SEP	SEP	X	OK

Notes: OK = Suitable in direct contact; SEP = Separate materials with an isolation piece; X = Not suitable direct or indirect contact. * CuNi is not suitable for potable water human consumption and is intended primarily for seawater use. Information is provided on a case-by-case basis for the products supplied by AusPress Systems and does not constitute general advice nor warranty.

Examples:

1. From copper into stainless 316 = OK.
2. From galvanised pipe into stainless 316 = SEP (separation required).

Common Situations

Scenarios where the risk of different metals installed may include:

- Brackets & channel supports.
- New connections to existing pipework.
- Bolts and fixings.
- Not-removed temporary items (such as signage or wire).
- Structural elements.
- Valves, flange connections, caps and other inline items.

Isolation Buffer Piece

Separating the metals to prevent direct contact is recommended.

This may be with a suitable intermediate material piece >100mm, inert surface finishes (such as paint) or non-conductive materials (such as plastic sleeves or rubber gaskets).

Consideration is to be made for the fixings of dissimilar flange types and bolt combinations as these too are subject to the same risks (ie galvanised bolts with stainless flange bases). Bracketing, fixings and valves also are also to be included in this assessment process.

Earthing

Metallic pipework is required to have suitable grounding to earth. This should be checked by a licenced electrician and compliant with Australian Standard AS/NZS 3500.

Further Reading

The Australian Stainless Steel Development Association (ASSDA) have information at <https://www.assda.asn.au/publications/technical-faqs/galvanicdissimilar-metal-corrosion> and online is a wide range of combination and testing results that may serve for specific scenarios for installers and specifiers to ensure suitability of materials.

Not sure?

Please contact us before installation so we can offer advice and suitability.