

AVT-373 Research Specialists' Meeting on "Emerging Technologies for Proactive Corrosion Maintenance"

MIL-STD-889 and the Impacts on Corrosion Prevention

**Rachel Black and Rachel Cusic, NAWCAD, United States of
America**

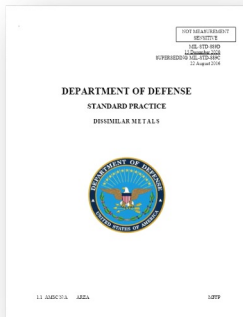
October 9, 2023



Background

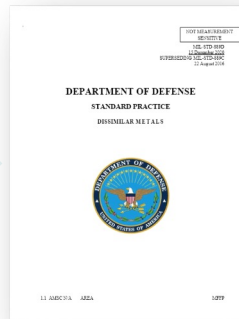
Purpose: This standard **defines and classifies dissimilar conductive materials** and establishes requirements for protecting coupled dissimilar materials against corrosion with attention directed to the anodic member of the couple.

MIL-STD-889B



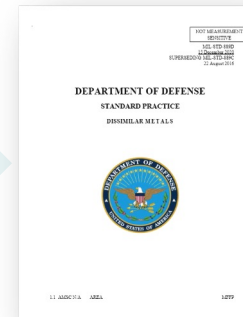
The last technical revision was done in 1967, based on an AMCOM report (TR-67-11). Was not done in sea water.

MIL-STD-889C



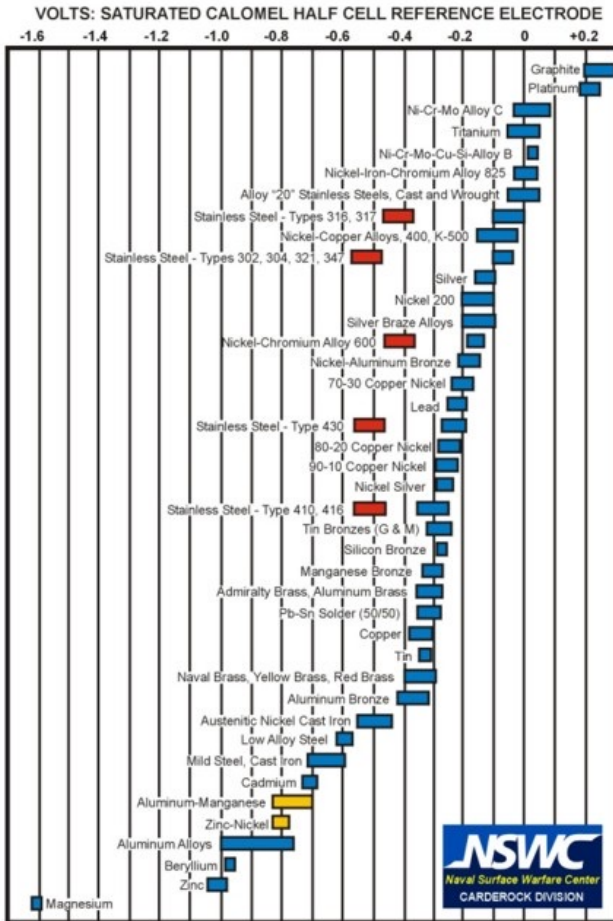
Modernized Revision: Current version was modernized in 2016 to replace obsolete references to other standards

MIL-STD-889D



Current Approach: This approach is to move to galvanic current, rather than potential, in order to determine galvanic compatibility.

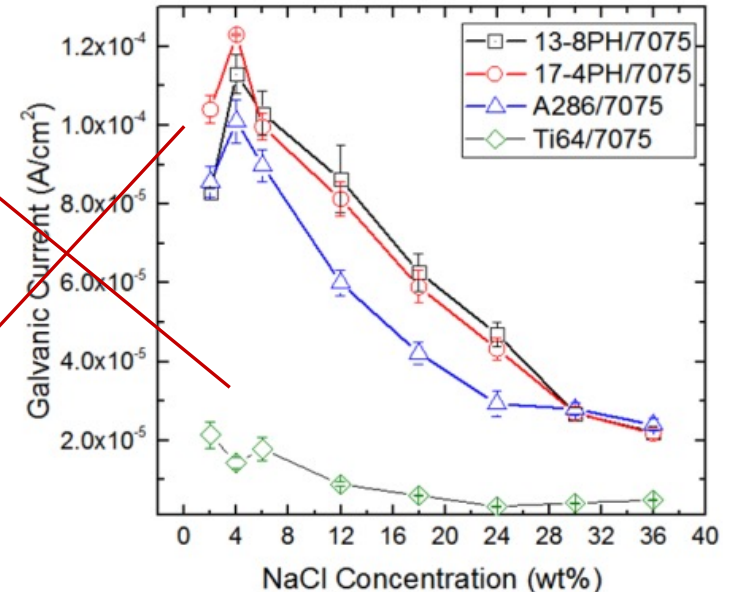
Why Shift to Kinetics?



← Titanium

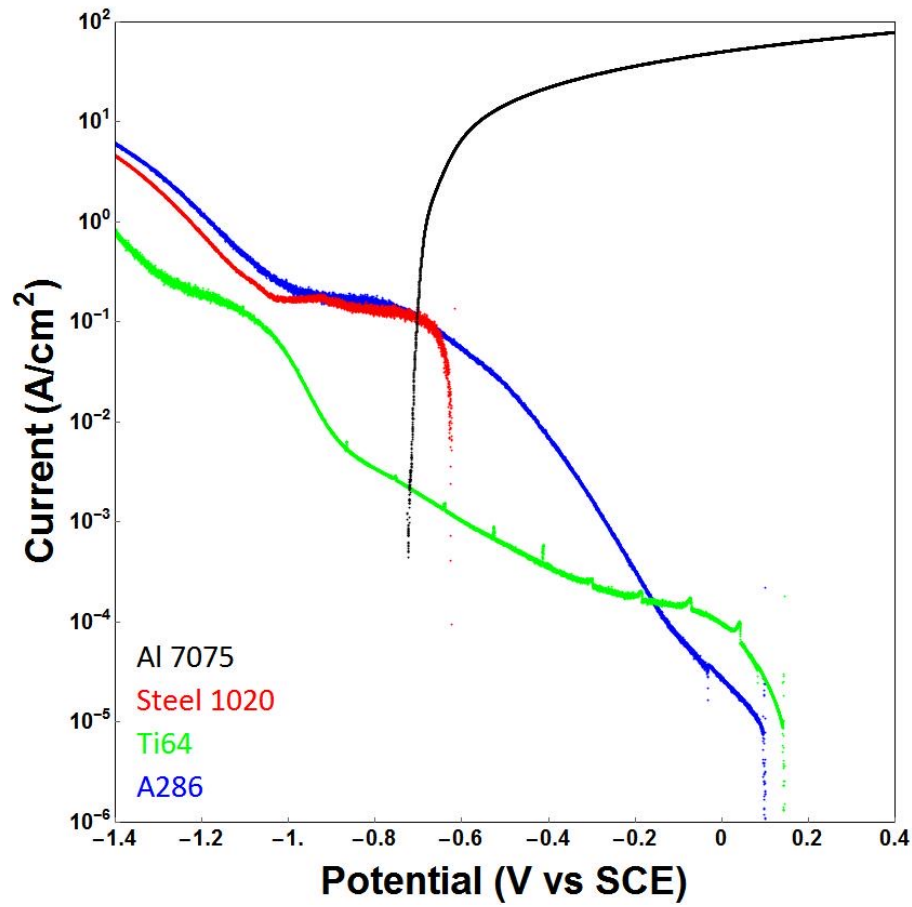
← Stainless Steels

← Al Alloys

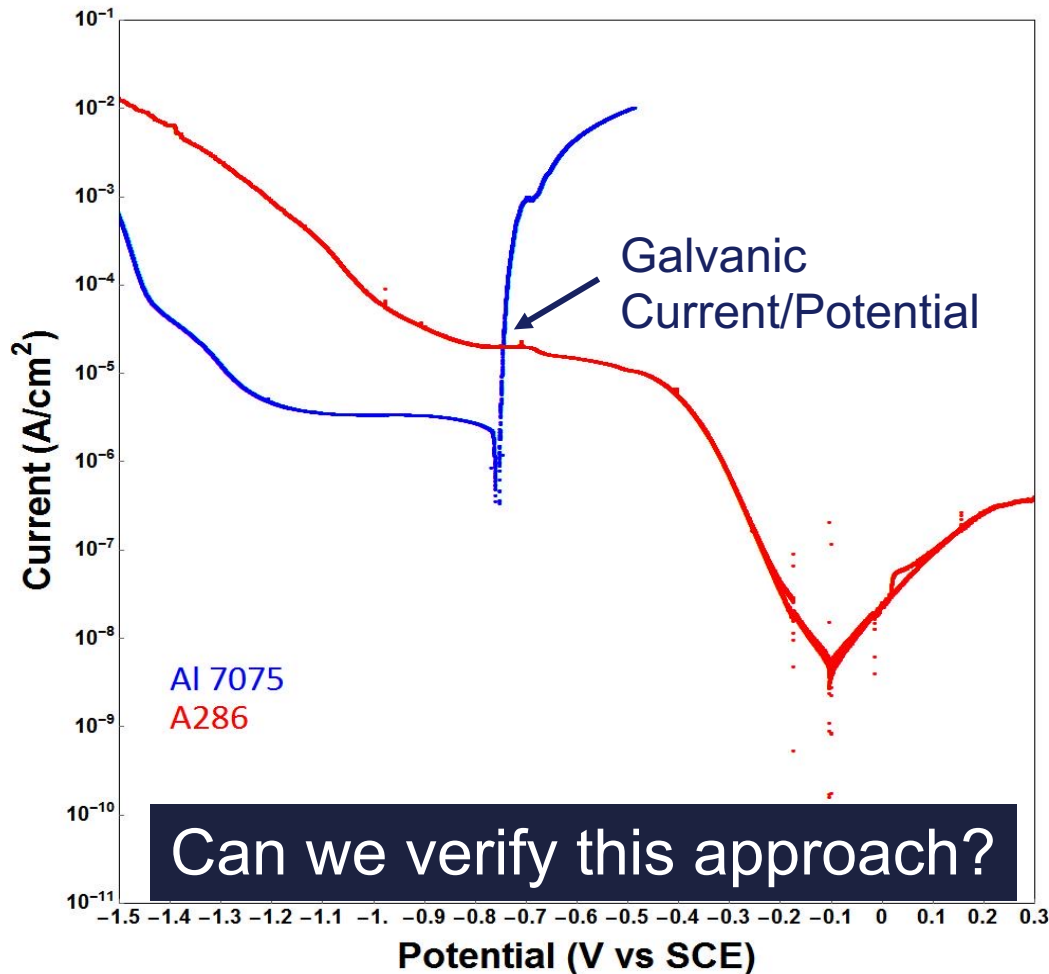


Based on the galvanic series, stainless steels are a better material choice than titanium when coupled to Al7075. However, titanium has almost an order of magnitude lower galvanic current.

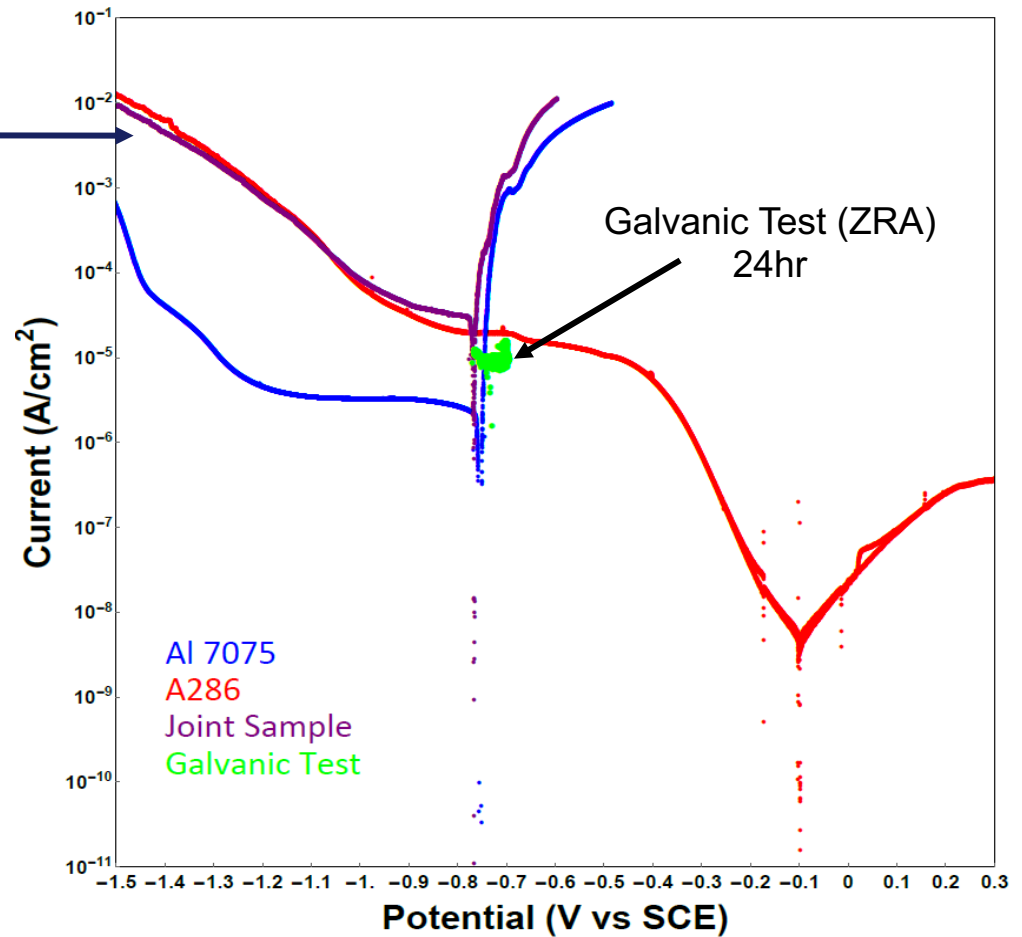
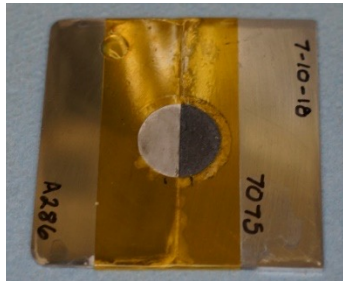
Kinetics Tells the Story of Rate



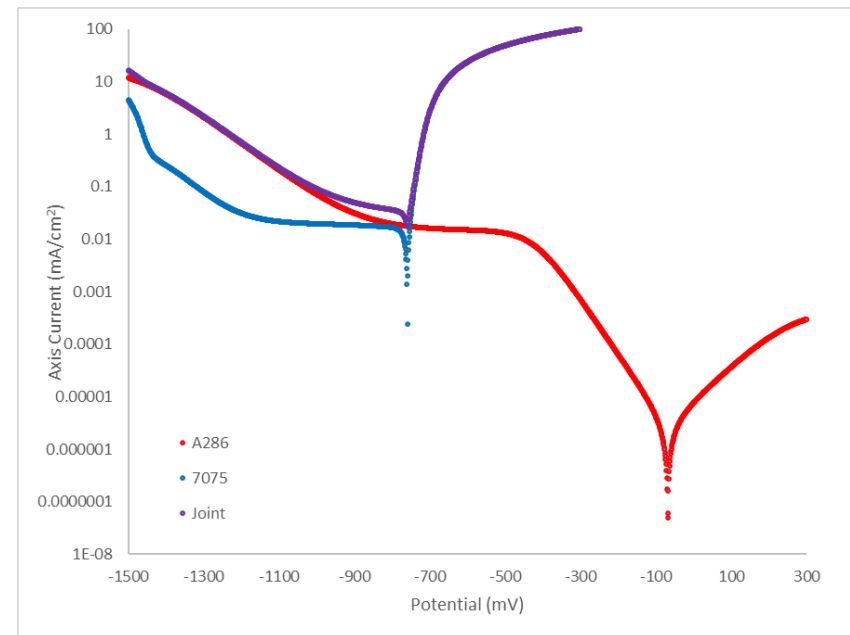
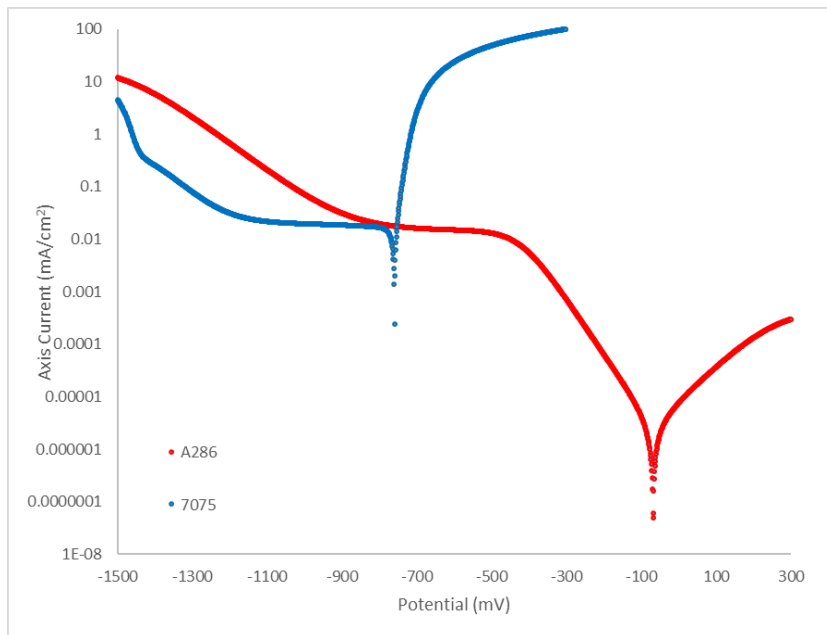
Mixed Potential



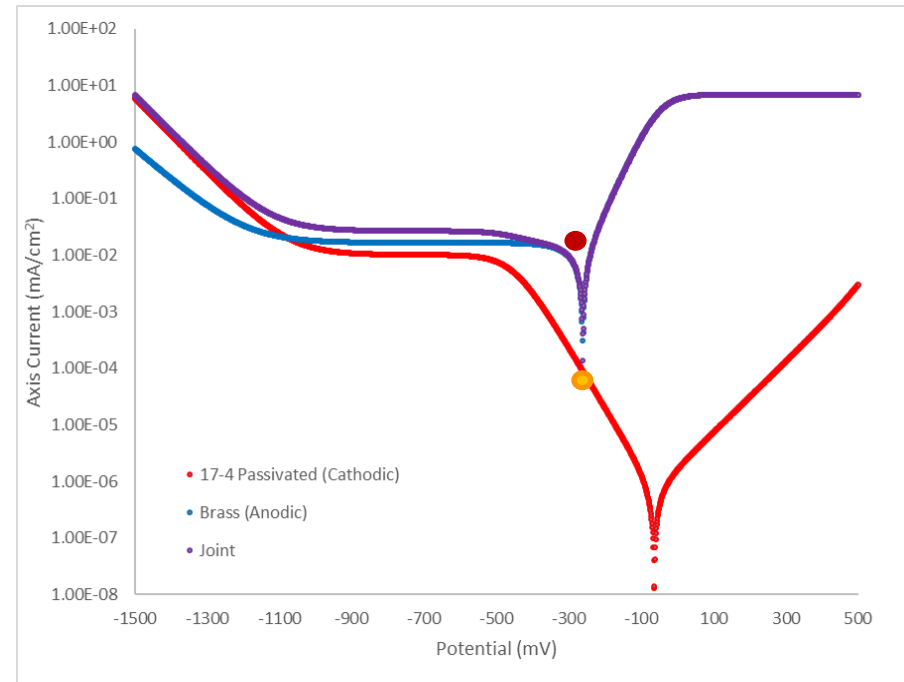
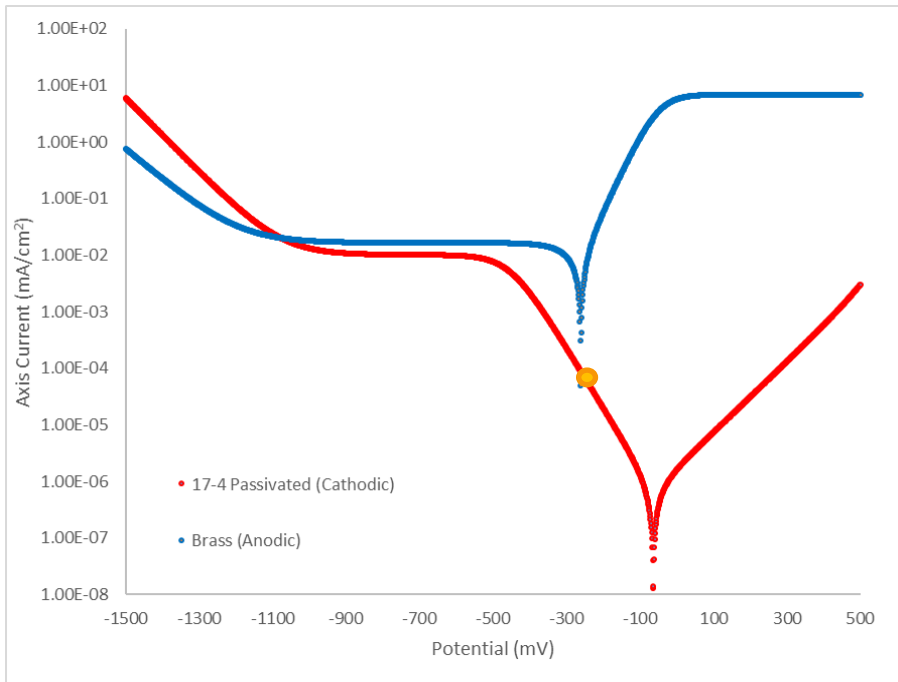
Mixed Potential



Summation vs. Intercept



Discrepancies Near OCP



MIL-STD-889 Database

All data that was collected by our lab can be found on DAU CPO site

<https://www.dau.edu/cop/cpc/Pages/Topics/Information-Sharing.aspx>

Interactive tool that displays MIL-STD-889 Data (Developed by LUNA Innovation, Inc.

<https://acuitycorrosion.com/products-2/galvanic-compatibility-tool/>

What about materials not in the table?

1. Talk with your Cognizant Engineering Authority

- a. Can you use a comparative material or do you need to collect the data?

2. Does your facility have the capability to collect the data or do you need to reach out to a third party?

- a. Industry Partner
- b. NAWCAD CPCS

Note: Physical data collection is required. Model-based data is not accepted at this time.

Where do we go from here?

- **Gather more data**
 - Various alloys
 - Different environments (atmospheric/thin film, industrial, etc.)
 - Model-based data
- **Start using the standard**
- **Track sections that require changes in future revisions**

What has the feedback been thus far?

- **Confidence**
 - Corrosion engineers are more confident they are providing accurate galvanic corrosion pairings
- **Uncertainty**
 - Engineers and scientists unanimously agree that this shift is scientifically stronger but are unsure about implementation
- **Interest**
 - Bi-monthly, a working group discusses use of standard and plans for future revisions/additions.

Questions?

Rachel Black – *MPT Branch Head NAWCAD*

rachel.e.black2.civ@us.navy.mil

Rachel Cusic – *CPCS Chemist NAWCAD*

rachel.m.cusic.civ@us.navy.mil