

**American Railway Engineering and Maintenance-of-Way Association
Letter Ballot 15-22-11**

Assignment: At the February 2022 meeting, a ballot was proposed and accepted by the subcommittee and general committee members present to incorporate commentary material on dissimilar metals in contact. This ballot presents the edits of the material for Article 9.8.7.1.6c(1).

Rationale: A task group has been working on incorporating material regarding corrosion when dissimilar metals are in contact. We have struggled finding a good landing place for this material. In an attempt to get this material in the 2023 manual we chose the location in the ballot. Work is ongoing to further develop this material with possibly its own article. The subcommittee voted to bring this material for a letter ballot.

Submitted by: John Sanders, Chair SC8 (Coatings & Special Construction)

Due Date: April 29, 2022

Insert new Article 9.8.7.1.6c(1)(c) as shown below, re-numbering existing Article 9.8.7.1.6c(1)(c) to 9.8.7.1.6c(1)(d) (additions shown as **underlined bold red**, deletions shown as **~~bold red strikethrough~~**, comments in brackets [] not part of published material).

9.8.7.1 GENERAL (**20222023**)

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9.8.7.1.6 Determination of Maintenance Coating Requirements

The following information...

- a. The description should ...
- c.

(1) Coating inspection should be included as part of a general inspection for loss of metal, broken connections, **galvanic corrosion of dissimilar metals**, or other structural defects, and should consider the following:

- (a) Degree of Corrosion: Typically evaluated ...
- (b) Any areas of severe corrosion, especially ...

[continued]

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(c) Condition assessments should include the investigation of galvanic corrosion where dissimilar metals are in direct contact on the structure. Some typical locations may include bearings, anchor bolts, handrails, walkways, electrical and mechanical supports, cables, utilities, and architectural attachments.

When dissimilar metals contact with electrolytes such as hydrolyzed salts, condensation, water or other sources such as oil, dirt, and airborne particles, they can produce an electrochemical reaction where one metal undergoes galvanic corrosion, thus losing thickness, while the other one maintains galvanic protection.

The electrode potentials of various metals and alloys are arranged in a list that is referred to as the galvanic series. When dissimilar metals are in direct contact with each other, the metal with the lower potential (less noble) performs as an anode and corrodes. Based on their positions within the galvanic series, zinc and aluminum and their alloys will corrode before carbon steel and carbon steel will corrode before stainless steel, copper, and bronze.

Measures that can be taken to curtail this phenomenon include excluding galvanized high-strength bolts and attachments from direct contact with weathering steel; Type 3 weathering-steel bolts should instead be used. For other components such as bearings where stainless steel must be welded to carbon steel, applying a nonconductive coating to the carbon steel will reduce the potential for galvanic corrosion. For other attachments, a dielectric barrier, such as rubber or polymer-based washers, gaskets, or nonconductive coatings, should be incorporated. If this is not feasible, a different corrosion protection system should be chosen for the connection.

(ed) Replacement of components or ...

[remainder unchanged]