

**Technical Note 106**

# **Crevice Corrosion Defect**

**November 2015**

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## 1 Scope

The purpose of this document is to explain the crevice corrosion defect Transport and Main Roads (TMR) has discovered with the failures of some members.

## 2 Defect identification

In the past all members were traditionally welded together with fillet welds to resist the design actions. TMR has found that when a hollow section is fillet welded to a base plate and the member is hot dip galvanised, corrosion is formed in the area under the hollow section material, refer to Figure 1.

As there is no zinc in this particular area, corrosion begins to occur and overtime, the corrosion can lead to the failure of members, as shown in Figure 2 and Figure 3.

The reason the corrosion commences is due to the pickling solution not being removed in the galvanising process. This pickling solution is hygroscopic (Attracts moisture) lead to the corrosion. The extent of the corrosion can vary. Figure 4 shows the corrosion which was found when two back to back angles were galvanised and the pickling solution was trapped between the members.

***Figure 1 – View of the corrosion that occurs between the parent materials***



***Figure 2 – View of hand rail which failed due to corrosion around the base plate***



**Figure 3 – View of the failure of a fence post after one year**



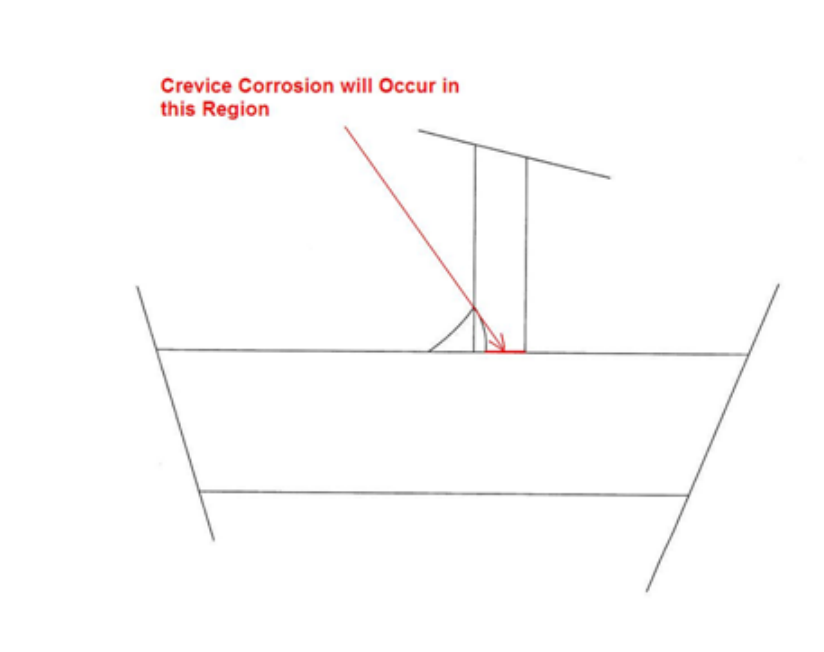
**Figure 4 – View of the corrosion when two back to back angles were placed against one another**



### **3 Design requirements**

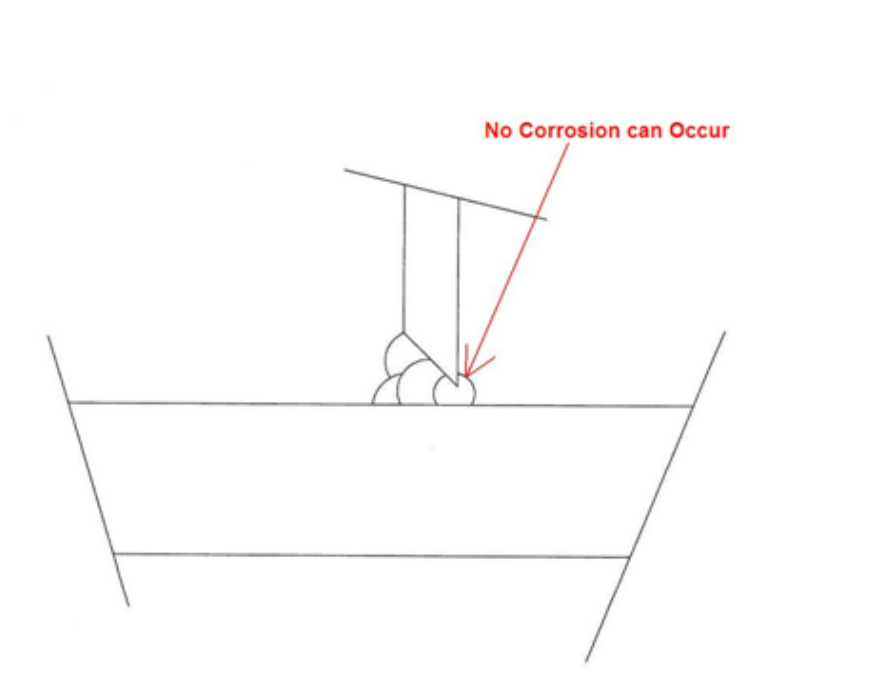
In a design specifies a fillet weld for hollow section material the crevice corrosion defect will occur in the area under the hollow section being welded, refer to Figure 5.

**Figure 5 – View of the crevice corrosion when a fillet weld is used**



In order to solve the crevice corrosion problem, TMR has found that when a butt weld is used, the crevice problem disappears, if the member is galvanised correctly in accordance with the requirements of AS/NZS 4680. Figure 6 shows the butt weld of the member resolves the crevice corrosion problem.

**Figure 6 – Design criteria specifies a butt weld**

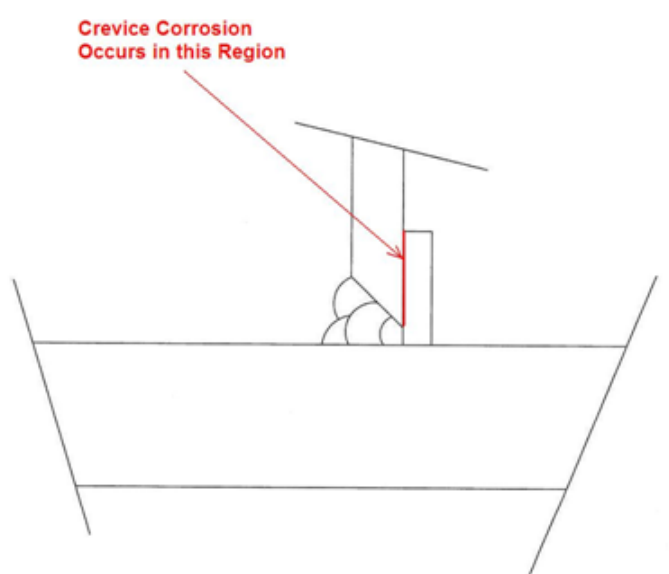


In the current version of AS/NZS 1554.1 the pre-qualified joints in the standard require butt welds to be placed with a backing bar. If the backing bar is permanently left inside the member, the crevice corrosion defect will still occur, as the top of the backing bar is not sealed off, refer to Figure 7.

Fabricators can place a butt weld without the need for a backing bar. The reason backing bars was introduced was due to the poor quality of welding being undertaken. TMR has solved this problem by

only allowing trade qualified staff to carry out welding on TMR project. As we are using higher skilled welders, there is no need for the backing bar.

**Figure 7 – View of the crevice corrosion defect when a backing bar is used**



TMR has been trialling an alternative detail for the welding of hollow section material with fillet welds. Figure 8 shows that if a fillet weld was to be used for hollow section material, a root gap is required under the member so the pickling can be removed from under the hollow section member. This detail would be more suited to minor structures, such a fence posts and anti-glare screens on the top of parapets.

**Figure 8 – Alternative fillet weld detail to using butt welds**

