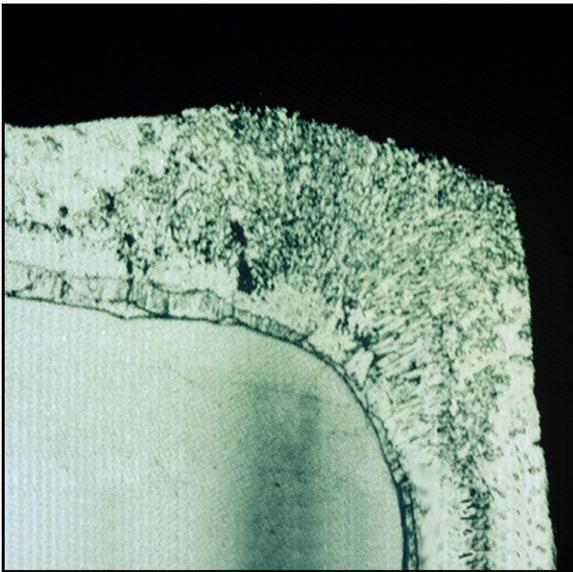


Painting and Hot Dip Galvanized Surfaces – Edges and Welds

Edge Protection

When a steel surface is galvanized, the zinc coating is metallurgically bonded to the original steel substrate.



As depicted in the photomicrograph (left) showing a cross-section of the edge of a galvanized article, the galvanizing process naturally produces coatings at the corners and edges, which are at least as thick as the coating on the rest of the article. This is due to the reaction between iron and zinc being a diffusion reaction and thus the crystalline structure of the coating forms perpendicular to the steel surface.

As coating damage is most likely to occur at the edges, this is where added protection is needed most.

Any naturally 'sharp' steel edge will have a degree of radius after galvanizing. The extent of this rounding is not specified in AS/NZS 4680 as it depends on steel thickness, chemistry and consequent coating thickness.

The recommendations in AS/NZS 2312:2002 Figure 3.1 relating to the painting of bare steel surfaces is shown below. This indicates that brush- or spray-applied coatings have a natural tendency to thin at corners and edges as shown in the left most part of the figure. As a result, there is a likelihood of early corrosion in these areas. This is the reason why the Standard recommends fabricators chamfer or round sharp edges.

Section 6.2 of AS/NZS 2312 provides recommendations as follows for paint coatings at edges:

For edges, crevices, ponded areas and microclimates, additional protective steps (such as stripe coating) may be necessary to achieve the predicted performance. This is particularly important in aggressive environments and for critical structures where future maintenance will be difficult.

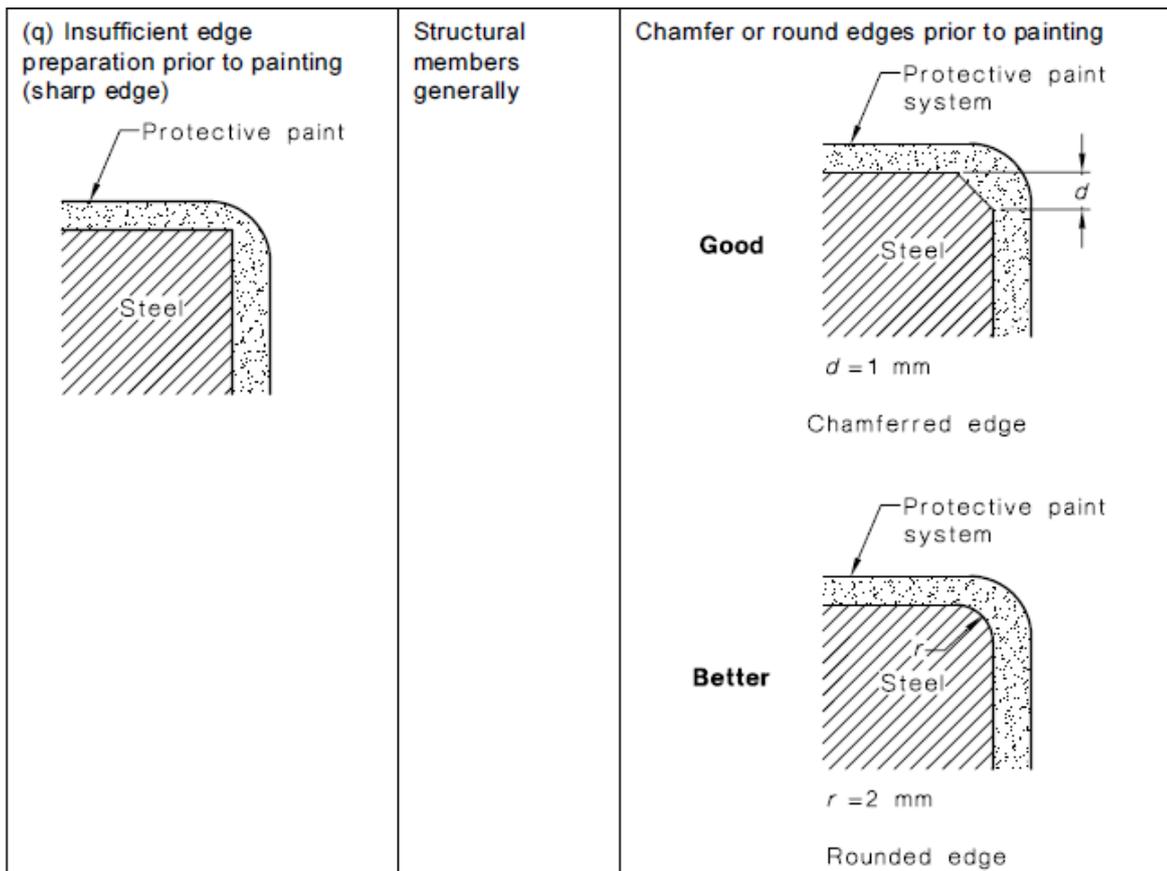


FIGURE 3.1 (in part) TYPICAL DESIGN PROBLEMS AND SOLUTIONS

Welds

Section 10.5 of AS/NZS 2312 provides recommendations as follows for welded sections that are to be painted:

In areas subject to severe corrosion, rough weld beads should be ground flush before coating; where this is impractical they should be stripe-coated using a brush.

For welded sections that are to be galvanized it is important to provide a high quality weld, including removal of weld spatter prior to galvanizing. This will reduce areas of potential crevice corrosion and provide a clean surface for the galvanizer to work with.

Appendix C5 of AS/NZS 4680 states:

It is important that the supplier remove all welding slags and spatter prior to delivery to the galvanizer.

General Surface Preparation Requirements for Galvanized Articles

As part of the preparation for painting it is important to remove or smooth out sharp edges, dags, weld spatter and laminations formed in the galvanized coating so that these imperfections in the galvanized surface shall not thwart the even build-up of the subsequent paint system.

It is critical that the galvanizer is advised when a hot dip galvanized article is going to be subsequently painted. The responsibility for the removal of any imperfections formed during galvanizing must be agreed prior to hot dip galvanizing.

AS/NZS 4680, Appendix I recommends the following practice for surface preparation of the coated surface prior to painting:

- Blast pressure 275 kPa (40 psi)
- Abrasive Grade 0.2 – 0.5 mm (clean ilmenite or garnet)
- Angle of blasting to surface no greater than 45°
- Distance from surface 350 – 400 mm
- Nozzle orifice diameter 10 – 13 mm of venturi type

It is important that this procedure be performed carefully to ensure that no more than 10 µm of zinc is removed. Organic paint coatings should be applied as soon as possible after abrasive blasting.

General Good Practice for Painting Galvanized Edges

Hot dip galvanized coatings will provide a naturally rounded edge with a slightly thicker coating for structures that are to be painted.

The GAA recommends that a fabricator does not normally need to round sharp edges or corners prior to galvanizing, or after galvanizing and prior to painting. However, the GAA do recommend a stripe coat as per the recommendations from the notes accompanying Table C1 of AS/NZS 2312 if the environment is aggressive or the product will be difficult to access for future maintenance purposes.

The use of 'stripe' coatings applied by brush to edges, welds, seams, etc. before each coat application is a recognized sound practice.

The GAA does recommend that welds be smoothed consistent with good welding practice and that weld splatter must be removed prior to galvanizing to ensure coating thickness and adhesion is to the users expectations. By following this practice, a proper surface for painting will be created.

Specification for Painting Hot Dip Galvanized Surfaces

AS/NZS 2312 provides guidance for specifications for painted surfaces. It does not provide an explicit specification for painting over hot dip galvanizing. A suitable specification has been developed by the GAA and this is available (at no cost) as part of our "Guide To Adopting Paint Systems for Galvanized Steel in Atmospheric Service", or see www.gaa.com.au for more information.

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