25. FACTORS AFFECTING GALVANIZING SERVICE AND QUALITY

INTRODUCTION

While the care taken in the galvanizing process and design of fabrications for galvanizing are major factors in determining the quality of the finished product, there are a number of other factors unrelated to the process that can affect the final appearance of the hot-dip galvanized product, or the efficiency with which the steel can be processed.

This load of fabricated steel contains a mixture of black steel, galvanized steel, painted and powder coated components welded in assemblies. This causes problems in the pre-treatment process for galvanizers

These are:

1. Surface condition

Steel that is heavily rusted will be slow to pickle and result in costly processing delays. Badly rusted steel should be abrasive blasted prior to delivery for galvanizing. While heavily pitted steel will galvanized satisfactorily after cleaning, the galvanized coating will reflect the profile of the rough steel surface.

2. Previously coated steel.

New steel sections, specifically hollow sections, are coated with a preservative paint coating in the manufacturing process. This coating is easily removed in the galvanized process. Steel that has been previously painted with architectural or industrial paint systems, should be cleaned by abrasive blasting prior to delivery for galvanizing, as these types of paints are difficult to remove in the pre-treatment process.

While the primer used on pipe sections is designed to easily removed in the galvanizers' pre-treatment process, uncoated sections (at the back) are much faster to process as they do not require paint stripping.

A range of hollow and light structural sections are manufactures with a thin zinc coating already applied. These are frequently used with black steel sections in fabrications to be hot-dip galvanized. While this zinc coating is easily removed, a stripping cost may be incurred as the zinc will accelerate the deterioration of the pre-treatment chemicals.

3. Type of product.

Heritage products that are may be brazed, riveted or soldered, or manufactured from wrought or cast iron may not be able to be galvanized, or may require special handling in the galvanizing process.

Riveted or brazed connection can be galvanized provided steel rivets are used. Aluminium pop rivets will dissolve in the pre-treatment chemicals. Solder will melt well below the temperature of the galvanizing bath.

Old wrought of cast iron may contain voids or non-metallic inclusions that will trap air or pre-treatment chemicals in the surface of the item, creating a risk of blow-outs or more serious steam explosions that could damage or destroy the item. Abrasive blasting prior to galvanizing can highlight any such defects and minimise the time in the pre-treatment process.

4. Weld quality

Welding slag is inert being a ceramic material, will not be removed during the pre-treatment process.

Welding slag left on fabrications will give rise to `misses' in the galvanized coating.

Weld splatter will be galvanized along with the steel to which it is attached, creating a rough and unsightly area adjacent to the weld.

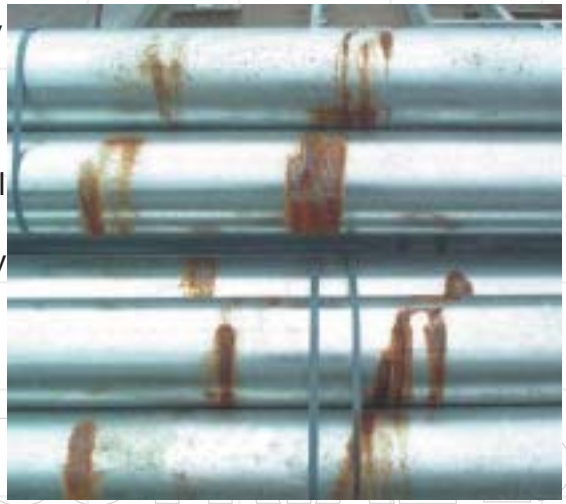
Most weld metal used for structural steel welding has a high silicon content. This will generally result in the weld areas having a thicker coating than the adjacent steel, and they may have a duller, gray appearance compared to the more shin y conventional galvanized surface. Where aesthetics are important and welds are required to be flush with the surrounding surfaces after galvanizing, low silicon welding wire should be used.

This long universal beam has been double dipped, leaving an aesthetically unacceptable double-dip mark on the beam. This can be avoided by sizing sections to single-dip dimensions.

Poor quality welds with inadequate penetration will allow pre-treatment chemicals to penetrate the joint. The poor weld quality will be manifested after galvanizing as staining around the weld joint occurs as these chemicals leach out of the joint.

Submerged arc welds used on heavy sections may contain small particles of flux fused into the weld surface. After galvanizing, these appear as pinholes in the weld metal. As they are generally smaller than 1 mm in diameter, and the galvanizing coating thickness on the weld is usually very high, they do not affect durability.

Abrasive blasting the weld areas prior to galvanizing can minimise this phenomenon.



This completed load of large galvanized pipes has been stained by prolonged storage on hardwood dunnage during periods of wet weather.

5. Very thick sections

Very thick cast steel sections (over 100 mm thick) such as counterweights or bollards can cause problems in the hot-dip galvanizing process. This occurs because their mass of the item is such that the zinc freezes around it, and remains frozen for several minutes until the heat of the steel increases to over 420°C – the melting point of zinc.

This phenomenon can result in the preflux coating on the steel surface deteriorating and not performing effectively. This will cause misses in the galvanized coating.

By abrasive blasting these types of items immediately prior to galvanizing, the cleaned steel surface will minimise the need for preflux and galvanize more readily.

6. Vent and drain hole locations

The location of vent and drain holes on hollow or partly closed sections, other than causing air locks or zinc puddling if poorly located, can cause unsightly runs or blowouts on the surface of the item if not correctly located or sized.

7. Lifting points

For larger items, the provision of lifting point for transporting the work through the galvanizing process will improve appearance and coating quality, and minimise the risk of handling damage in the process.

If chains have to be used to support the work, ‘chain marks’ will be unavoidable. This is particularly undesirable on larger circular sections such as poles, where there will be a large area of contact between the lifting chains and the surface of the item.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01 - SPECIFIERS MANUAL — THIRD EDITION

Industrial Galvanizers Australian Galvanizing Division (IGAG) operates nine galvanizing plants around Australia, ranging in size from large structural galvanizing facilities to specialised small plants designed to process small parts.

The Australian Galvanizing Division has galvanized in excess of 2 million tonnes of steel products in Australia since its first plant was commissioned in 1965 and is recognized for its ability to handle complex and difficult projects, as well as routine contracts.

This experience has been collated in the Specifiers Design Manual, to assist those involved in the design of steel products and projects to better understanding the galvanizing process and allow the most durable and cost-effective solutions to be delivered to these products and projects. All sections of this Third Edition have been completely updated and additional sections have been included to provide additional technical information related to the use of hot dip galvanized steel.

In addition to its Australian Galvanizing operations, Industrial Galvanizers Corporation has a network of manufacturing operations in Australia, as well as galvanizing and manufacturing businesses throughout Asia and in the USA.

The company's staff in all these locations will be pleased to assist with advice on design and performance of hot dip galvanized coatings and products. Contact details for each of these locations are located elsewhere in this manual.

This edition of the Industrial Galvanizers Specifiers Manual has been produced in both html and .pdf formats for ease of access and distribution and all documents in the Manual are in .pdf format and can be printed if paper documents are required.

The Specifiers Manual is also accessible in its entirety on the company's web site at www.ingal.com.au.

Additional copies of the Specifiers Manual are available on CD on request.

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