

COATING SPECIFICATION

HOT-DIP GALVANISING OF STEEL STRUCTURES

COATING SPECIFICATION: H2

ISSUE: 4

DATE: OCTOBER 2022

1.0 SCOPE

This document summarises the Hot-Dip Galvanising of steel structures in accordance with AS/NZS 4680.

Refer to Design Standard, DS 95 (Standard for the Selection, Preparation, Application, Inspection, and Testing of Protective Coatings on Water Corporation Assets) for details for additional information or clarification.

For any aesthetic top coat application, references shall be made to Corporation surface preparation specification **A3 - Surface Preparation for the application of Protective Coatings on Galvanized Steel**, coating specification **E4 - Epoxy Mastic, Polyurethane Top Coat on Galvanised Steel**.

For repairs on galvanised coated structures, refer to Corporation coating specification **H1 – Repair of Galvanised Coating**.

2.0 PURPOSE

The purpose of this coating specification is to provide guidance for Corrosion Inspectors on the inspection of galvanised structures.

3.0 DEFINITIONS

ACA: Australasian Corrosion Association.

Contractor: The service provider or its sub-contractor who will undertake the works.

Corporation: The Water Corporation and the Principal for the purposes of externally contracted asset delivery.

DFT: Dry Film Thickness.

GAA: Galvanisers Association of Australia.

ITP: Inspection and Test Plan(s) for the Works.

NACE: National Association of Corrosion Engineers.

Superintendent: The superintendent for the contract, as defined in the conditions of contract, who is appointed by the Water Corporation to manage/oversee the work under the contract on behalf of the Water Corporation.

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Works: the surface preparation, coating application, and inspection to be undertaken by the contractor to which this coating specification applies.

4.0 ZINC COATING MASS AND THICKNESS

- 4.1 Steels containing higher than standard levels of sulphur, silicon or phosphorous can produce thick galvanized coatings that are not of uniform appearance and have lower impact resistance than galvanized coatings on standard grades of steel.
- 4.2 Small parts may be galvanized using a centrifuge process to remove excess zinc from the components. This produces a galvanized coating that contains less free zinc than those that are galvanized using standard hot-dipping procedures.
- 4.3 The coating thickness produced by hot dip galvanising is reflected in the following **Tables 1 and 2**.

Table 1 - Coating thickness requirements and mass for articles that <u>are not</u> centrifuged Article thickness, mm	Local coating thickness minimum, μm	Average coating thickness minimum, μm	Average coating mass minimum, g/m^2
<1.5	35	45	320
>1.5 <3	45	55	390
>3 \leq 6	55	70	500
> 6	70	85	600

Table 2 - Coating thickness requirements and mass for articles that are centrifuged

Thickness of articles (all components including castings), mm	Local coating thickness minimum, μm	Average coating thickness minimum, μm	Average coating mass minimum, g/m^2
<8	25	35	250
\geq 8	40	55	390

NOTE: 1 g/m^2 coating mass = 0.14 micron coating thickness.

5.0 COATING FINISH

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- 5.1 Galvanised coating shall be continuous and as smooth and evenly distributed as possible and shall be free of defects that may affect the stated use of the article. For further information, refer clause 7.0 of AS/NZS 4680.
- 5.2 The interface between all hot dip galvanised roof components, including:
- Cleats and purlins;
 - Purlins and roof sheeting;
 - Purlins and working platform;
 - Bridging and purlins;
 - Sheeting and working platform and
 - Sheeting end laps only (side laps excluded).

shall be liberally coated, prior to assembly, with a potable water approved paint (International Paints “Interline 876” or approved equivalent) to completely eliminate moisture collecting in the crevice, and to provide some insulation between dissimilar metals [Refer: Photos 2 & 3].



Photo 2 – Coating on galvanised cleats to prevent crevice/dissimilar metal corrosion.



Photo 3 - Coating on the galvanised beam to prevent crevice/dissimilar metal corrosion.

6.0 COATING APPLICATOR/PERSONNEL QUALIFICATION

- 6.1 Work shall only be carried out by competent personnel. Galvanising shall be carried out by a member of the Galvanisers Association of Australia (GAA).

7.0 REPAIRABLE DAMAGED OR UNCOATED AREAS

- 7.1 The Galvanised steel surface shall be adequately cleaned prior to painting.
- 7.2 For objects galvanised after fabrication, the sum total of the damaged or uncoated areas shall not exceed 0.5% of the total surface area or 250 cm², whichever is the lesser, and no individual damaged or uncoated area shall exceed 40 cm².

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- 7.3 Surfaces that remain uncoated during the galvanising process as outlined above and require repair, shall be repaired by the following application:
- (a) Organic zinc rich epoxy primer (not less than 92% zinc in the dried paint film) complying with Australian Standard AS 3750.9 is to be applied to the repair areas in two coats. Each coat shall have a minimum dry film thickness of 50 microns for optimum performance.
- 7.4 References shall also be made to Corporation coating specification H1 - Repair of Galvanised coatings.
- 7.5 For defects in galvanised products, refer to Section 6.0 in Chapter 2 – Design, Specification, Inspection of Galvanized products, Galvanizers Association of Australia, www.gaa.com.au.

8.0 INSPECTION AND TESTING OF COATING

- 8.1 Coatings shall be visually examined for surface defects and any discontinuity arising after curing shall be recorded. Refer Section 9.0 for more information on galvanised coating defects.

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9.0 DEFECTS ON GALVANISED PRODUCTS

Appearance of Galvanised coatings	Defects 
<p>Dull Grey Appearance usually occurs on steels with relatively high silicon content which are reactive to molten zinc. Dull grey coatings are often thicker than the normal bright or sparkling zinc coating.</p> <p>General Comment: Acceptable.</p>	
<p>Rust Stains On the surface of galvanised coatings is usually due to contact with or drainage from other corroded steel surfaces.</p> <p>General Comment: Acceptable when present as a surface stain.</p>	
<p>Dark Spots/Flux Staining/Ash Inclusions Are due to dirt picked up on the surface of the galvanised coating from floors and trucks or from contact with other structures and can be readily washed off to reveal a sound coating and are not harmful.</p> <p>General Comment: Acceptable if dirt residues have been removed.</p>	
<p>Blisters In galvanized coatings are due to hydrogen absorbed by steel during pickling being expelled as a result of the heat of the galvanizing process.</p> <p>General Comment: Small intact blisters are acceptable.</p>	





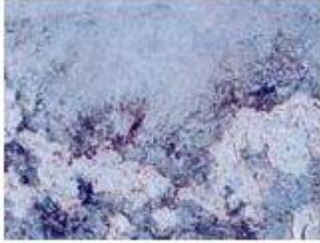
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Appearance of Galvanized coatings	Defects 
<p>General roughness and thick coatings On welds will result when welding electrodes containing silicon have been used. The galvanised coatings on the weld area may be thicker than normal and therefore provide longer protective life.</p> <p>General Comment: Acceptable, unless otherwise agreed.</p>	
<p>Lumpiness and runs Arising from uneven drainage are not detrimental to coating life.</p> <p>General Comment: Acceptable unless otherwise specified.</p>	
<p>Pimples Are caused by inclusions of dross (zinc-iron alloy) in the coating. Fine dispersion of pimples is not objectionable. Gross dross inclusions may be grounds for rejection as they tend to embrittle the coating.</p> <p>General Comment: May be grounds for rejection depending on size and extent.</p>	
<p>Wet Storage Stain or Bulky White Deposit A bulky white or grey deposit, known as wet storage stain may form on the surface of closely stacked freshly galvanized articles which become damp under poorly ventilated conditions during storage or transit. In extreme cases, the protective value of the zinc coating may be seriously impaired but the attack is often very light despite the bulky appearance of the deposit.</p> <p>General Comment: Acceptable unless otherwise specified.</p>	

 Obtained from <http://www.gaa.com.au/>

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Document Revision History					
Sect.	Issue	Date	Revision Description	RVWD.	APRV.
1	4	10/10/22	Amend scope, definitions	JF/MS	SS
4	4	10/10/22	Update tables 1, 2 and Section 7.3	JF/MS	SS

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