# STANDARD SPECIFICATION FOR HOT DIP GALVANIZING

This specification has been prepared by the galvanizing industry through its technical working group, in consultation with industry and a number of consulting engineering groups. It is intended to be used in conjunction with Australian/New Zealand Standard 4680 and is designed for simple insertion into specifiers’ overall materials specifications.

## NOTE

Prior to commencement of design it is recommended that the designer/fabricator refer to Australian/New Zealand Standard 2312.2, *Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings, Part 2: Hot dip galvanizing*, and to the chapter on Design in the manual *After Fabrication Hot Dip Galvanizing*, produced by Galvanizers Association of Australia.

AS/NZS 2312.2 provides recommendations on techniques to minimise distortion and embrittlement, the effect of steel chemistry on the appearance and thickness of coatings

**If the galvanized coating is to be subsequently painted or any other special treatment is required, these requirements should be brought to the attention of the galvanizer at the time of enquiry and order so that they can prepare the product appropriately.**

## SCOPE

This specification covers the galvanized coating applied to general steel articles, structural sections, angles, channels, beams, columns, fabricated steel assemblies, threaded fasteners and other steel components.  This specification does not apply to the galvanized coating on semi-finished products such as wire, tube or sheet galvanized in specialised or automatic plants.

## RELEVANT STANDARDS

|  |  |
| --- | --- |
| AS/NZS 1214 | Hot dip galvanized coatings on threaded fasteners |
| AS 1627.1 | Preparation and pre-treatment of surfaces - Removal of oil, grease and related contamination |
| AS 1627.4 | Preparation and pre-treatment of surfaces - Abrasive blast cleaning of steel |
| AS 1627.5 | Preparation and pre-treatment of surfaces - Pickling |
| AS/NZS 2312.2 | Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings - Part 2: Hot dip galvanizing |
| AS 4312 | Atmospheric corrosivity zones in Australia |
| AS/NZS 4680 | Hot-dip galvanized (zinc) coatings on fabricated ferrous articles |

## GENERAL

The galvanized coating on all steel articles on the following drawings and material lists shall conform to the requirements of AS/NZS 4680 and as specified herein.

Drawings:

Items:

## FABRICATION

Care shall be taken to avoid fabrication techniques which could cause distortion or embrittlement of the steel.

All welding slag and burrs shall be removed prior to delivery to the galvanizer.

Holes and/or lifting lugs to facilitate handling, venting and draining during the galvanizing process shall be provided at positions as agreed between the designer and the galvanizer.

## SURFACE PREPARATION

Unsuitable marking paints shall be avoided and consultation by the fabricator with the galvanizer about removal of grease, oil, paint and other deleterious materials shall be undertaken prior to fabrication.

Surface contaminants and coatings, which cannot be removed by the normal chemical cleaning process in the galvanizing operation, shall be removed by abrasive blast cleaning or some other suitable method.

Steelwork shall be pre-cleaned in accordance with the requirements of AS 1627.1 followed by acid pickling, in accordance with the requirements of AS 1627.5. Abrasive blast cleaning to Class 2 finish in accordance with the requirements of AS 1627.4 may be used.

## GALVANIZING

All articles to be galvanized shall be handled in such a manner as to avoid any mechanical damage and to minimize distortion. (See Note 2 above)

Design features that may lead to difficulties during galvanizing should be pointed out prior to galvanizing.

Galvanizing parameters such as galvanizing temperature, time of immersion, and withdrawal speed shall be employed to suit the requirements of the article.

The composition of the zinc in the galvanizing bath shall comply with AS/NZS 4680.

## COATING REQUIREMENTS

### 1 Thickness

**Table 1. Requirements for coating thickness and mass for articles that are not centrifuged**

|  |  |  |  |
| --- | --- | --- | --- |
| **Steel Thickness mm** | **Local coating thickness minimum μm** | **Average coating thickness minimum μm** | **Average coating mass minimum g/m²** |
| ≤1.5 | 35 | 45 | 320 |
| >1.5 to ≤3 | 45 | 55 | 390 |
| >3 to ≤6 | 55 | 70 | 500 |
| >6 | 70 | 85 | 600 |

**Table 2. Requirements for coating thickness 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/m²** |
| <8 | 25 | 35 | 250 |
| ≥8 | 40 | 55 | 390 |

Note: 1 g/m² coating mass = 0.14 μm coating thickness.

The thickness of the galvanized coatings on ISO metric coarse threaded fasteners shall conform to the requirements of AS/NZS 1214:

The thickness of the galvanized coating shall first be tested by the purchaser/designer at the galvanizer’s works, using an approved magnetic measuring device. In the event of any dispute, an independent test shall be carried out in accordance with AS/NZS 4680, Appendix G.

### 2 Surface Finish

The galvanized coating shall be continuous, adherent, as smooth and evenly distributed as possible, and free from any defect that is detrimental to the stated end use of the coated article. On silicon killed steels, the coating may be dull grey, which is acceptable provided the coating is sound and continuous (See Note 3). Any reparation is to be carried out as per Clause 8 of AS/NZS 4680.

The integrity of the coating shall be determined by visual inspection and coating thickness measurements. Where slip factors are required to enable high strength friction grip bolting, where shown, these shall be obtained after galvanizing by suitable mechanical treatment of the faying surfaces.

Where a paint finish is to be applied to the galvanized coating, all sharp spikes shall be removed and all edges shall be free from excessive lumps and runs.

### 3 Adhesion

The galvanized coating shall be sufficiently adherent to withstand normal handling during transport and erection.

## INSPECTION

Inspection shall be carried out at the galvanizer’s works by a designated party, or at some other place as agreed between fabricator and galvanizer.

## CERTIFICATION

When requested by the purchaser/designer, a certificate shall be provided stating that the galvanizing complies with the requirements of AS/NZS 4680.

## TRANSPORT AND STORAGE

Galvanized components shall, wherever possible, be transported and stored under dry, well-ventilated conditions to prevent the formation of wet storage staining following the recommendations contained in AS/NZS 4680 Appendix F.

A passivation treatment after galvanizing may be used to minimise the wet storage staining which may occur on articles unable to be stored in dry, well-ventilated conditions.

Any wet storage staining shall be removed by the galvanizer if formed prior to leaving the galvanizer’s plant, unless late pick-up or acceptance of delivery has necessitated the material being stored in unfavourable conditions.  Provided the coating thickness complies with the requirements of AS/NZS 4680, no further remedial action is required to the stained areas.

## WELDING

Where galvanized steel is to be welded, adequate ventilation shall be provided. If adequate ventilation is not available, supplementary air circulation shall be provided. In confined spaces a respirator shall be used.

Grinding of edges prior to welding may be permitted to reduce zinc oxide fumes formed during welding and eliminate weld porosity which can sometimes occur.

All uncoated weld areas shall be reinstated – see Coating Reinstatement or Clause 8 of AS/NZS 4680.

## COATING REINSTATEMENT

Areas of significant surface that are uncoated shall, by agreement between the purchaser and the galvanizer, be reinstated by following the recommendations contained in AS/NZS 4680 - Repair after Galvanizing, or by other methods nominated by the galvanizer and approved by the contractor. Similar repair methods shall be used for areas damaged by welding or flame cutting, or during handling, transport and erection.

The size of the area able to be repaired shall be relevant to the size of the object and the conditions of service but shall normally be in accordance with the provisions of AS/NZS 4680 - Repair after Galvanizing.

### SWEEP (BRUSH) BLAST CLEANING OF GALVANIZED STEEL PRIOR TO PAINTING

Refer AS/NZS 2312.2 Clause 7.5.3.2

### GENERAL INFORMATION ON FACTORS THAT AFFECT THE CORROSION OF GALVANIZED STEEL

Refer AS/NZS 2312.2.