**Standard Specification for Hot Dip Galvanized Coatings**

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 AS/NZS 4680:2006 and is designed for simple insertion into specifiers' overall materials specifications.

**Note**

1. Prior to commencement of design it is recommended that the designer/fabricator refer to AS/NZS 4680, in particular Appendix C `Recommended procedures for design and preparation of materials prior to galvanizing', and to the Design for Galvanizing tab on the Galvanizing Association of New Zealand website.
2. The designer is referred to the recommendations contained in Appendix D of AS/NZS 4680 to minimize distortion and reduce the likelihood of other issues occurring.
3. High strength low alloy steels, particularly those containing high silicon can, when galvanized, produce brittle coatings which are thicker and different in colour to normal coatings. The high silicon content in weld deposits made by automatic welding processes may result in thicker coatings being formed on these areas. These coating characteristics are usually beyond the control of the galvanizer.
4. 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 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 2309 Durability of galvanized and electrogalvanized zinc coatings for the protection of steel in structural applications - Atmospheric

AS/NZS 2312 Guide to the protection of structural steel against atmospheric corrosion by the use

 of protective coatings

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.

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 Preparation**

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**

The thickness of the galvanized coating shall conform with Table 1 in AS/NZS 4680.

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

Steel

|  |  |  |  |
| --- | --- | --- | --- |
| **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 ≤3.0 | 45 | 55 | 390 |
| >3.0 ≤6.0 | 55 | 70 | 500 |
| >6.0 | 70 | 85 | 600 |

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

The thickness of the galvanized coatings on threaded fasteners shall conform with Table 2 in AS1214.

**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** |
| <8.0 | 25 | 35 | 250 |
| ≥8.0 | 40 | 55 | 390 |

Note: For requirements for threaded fasteners refer to AS 1214.

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

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.

1. **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 spikes shall be removed and all edges shall be free from lumps and runs. (See Note 4)

1. **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.

**Certificate**

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 Reinstatementor 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 4680 Appendix I

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

Refer AS/NZS 4680 Appendix H

Galvanized products should be specified in accordance with the appropriate national standards, which have been drawn up to provide minimum standards to ensure optimum performance of galvanized products and to give guidance in selection, application, and design.

AS/NZS 2312 `Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings' is a particularly valuable reference in the selection of the most practical, economic coating in particular applications.