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 Australian/New Zealand Standard 4680 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 Australian/New Zealand Standard 4680 Appendix C 'Recommended procedures for design and preparation of materials prior to galvanizing', and to the chapter on Design in the manual 'Hot Dip Galvanizing', produced by Galvanizers Association of Australia.

2 The designer is referred to the recommendations contained in Appendix D of AS/NZS 4680 to minimise distortion and reduce the likelihood of embrittlement occurring.

3 High strength low alloy steels, particularly those containing 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 if an architectural finish 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.

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 1214-1983 Hot dip galvanized coatings on threaded fasteners.

AS 1627-1989 Part 1 Cleaning using liquid solvents and alkaline solutions.

AS 1627-1989 Part 4 Abrasive blast cleaning.

AS 1627-1975 Part 5 Pickling steel surfaces (in part).

AS/NZS 4680-1999 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 4680-1999 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 precleaned in accordance with the requirements of AS 1627 Part 1 followed by acid pickling, in accordance with the requirements of AS 1627 Part 5. Abrasive blast cleaning to Class 2 finish in accordance with the requirements of AS 1627 Part 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 minimise 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 not be less than 98.0% zinc.

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 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 ≤6	55	70	500
>6	70	85	600

Note: 1 g/m^2 coating mass = 0.14 µm coating thickness.

The thickness of the galvanized coatings on threaded fasteners shall conform with Table 2 in AS 1214:

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/m^2
<8	25	35	250
≥8	40	55	390

Notes: 1. For requirements for threaded fasteners refer to AS 1214. 2. 1 g/m^2 coating mass = 0.14 µm 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.

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, provided the coating is sound and continuous. (See Note 3)

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 at left).

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.

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 chromate 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.

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, Appendix E, 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, Appendix E.

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