6781 HOT DIP GALVANIZING

1. GENERAL

If you have pre-customised this work section using the "questions and answers" provided as part of the downloading process, it may be necessary to amend some clauses to suit the final project-specific version.

The section must still be checked and customised to suit the project being specified, by removing any other irrelevant details and adding project-specific details and selections.

This section relates to hot dip galvanizing of structural steel framing, general steel articles and fabricated steel assemblies.
Modify or extend the above description to suit the project being specified.
Note, for salt spray zones and very corrosive environments exposed steel may need galvanising plus added protection.

Related work

1.1 RELATED SECTIONS
Refer to Structural Steelwork section for fabrication of structural steelwork.
Refer to 4911 STEEL METALWORK for non structural steelwork.
Include cross references to other sections where these contain related work.
Refer to 6745 PROTECTIVE COATINGS - STEELWORK for specialist paint finishes to structural steelwork.
Refer to 6782 METAL SPRAY CORROSION PROTECTION for zinc and aluminium/zinc spray finishes.
For standard finishes refer to the painting section/s and 6745 PROTECTIVE COATINGS - STEELWORK.

Documents

1.2 DOCUMENTS REFERRED TO
Documents referred to in this section are:

AS/NZS 2312.2	Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings - Hot dip galvanizing
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS 1627.1	Metal finishing - Preparation and pretreatment of surfaces - Method selection guide - Removal of oil, grease and related contamination
AS 1627.2	Metal finishing - Preparation and pretreatment of surfaces - Method selection guide - Power tool cleaning
AS 1627.4	Metal finishing - Preparation and pretreatment of surfaces - Method selection guide - Abrasive blast cleaning
AS 1627.9	Metal finishing - Preparation and pretreatment of surfaces - Method selection guide - Pictorial surface preparation standards for painting steel surfaces
AS 1897	Electroplated coatings on threaded components (metric coarse series)

Delete from the DOCUMENTS clause any document not cited. List any additional cited documents.

RELATED DOCUMENTS
Refer to the following related documents when preparing this section:

AS/NZS 4791	*Hot-dip galvanized (zinc) coatings on ferrous open surfaces - applied by an in-line process*
AS/NZS 4792	*Hot-dip galvanized (zinc) coatings on ferrous hollow sections*
AS/NZS ISO 9001	*Quality management systems - Requirements*

Galvanizing Association of New Zealand - After-Fabrication Hot Dip Galvanizing. A practical reference for designers, specifiers, engineers, consultants, manufacturers and users

1.3 MANUFACTURER'S DOCUMENTS
Manufacturer's and supplier's documents relating to work in this section are:
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Copies of the above literature are available from ~
Web: ~
Email: ~
Telephone: ~

Facsimile: ~

It is important to ensure that all personnel on site have access to accurate, up to date technical information on the many products, materials and equipment used on a project. In most cases individual products are not used in isolation, but form part of a building process. Also a particular manufacturer's and/or supplier's requirements for handling, storage, preparation, installation, finishing and protection of their product can vary from what might be considered the norm. Access to technical information can help overcome this potential problem.

Requirements

1.4 QUALIFICATIONS

Galvanizers to be experienced, competent workers, and familiar with the materials and techniques specified.

1.5 VENT & DRAIN HOLES

Galvanizer to provide appropriate vent and drain holes if required, to hollow sections and enclosed elements, to AS/NZS 4680 and AS/NZS 2312.2.

1.6 AGREE VENT & DRAIN HOLE LOCATIONS

Galvanizer to provide layout, for approval, of appropriate vent and drain holes to exposed, hollow sections and enclosed elements. Do not make vent and drain holes until approved. Refer to SELECTIONS for elements requiring approval.

For exposed elements where appearance is important. As vent and drain holes are a serious safety issue always take the advice of the Galvaniser.

Delete this clause if vent and drain hole locations are not an issue.

1.7 TEMPORARY MEMBERS

Before galvanizing, ensure that all necessary appropriate temporary support members have been provided to minimise distortion during galvanizing.

Advise Contractor if temporary work is insufficient.

This clause usually only applies to prefabricated steel frames and elements to be hot dip galvanized. Discuss with galvanizer to determine if temporary members are required (delete clause if not required).

Temporary members are usually installed by the steel fabricator on the advice of the designer and/or galvanizer. Coordinate with steel specification and drawings.

Performance

1.8 QUALITY ASSURANCE

Maintain testing for galvanizing to AS/NZS 4680 and other specialist coatings as necessary to assure that work is performed in accordance with this specification and the qualifying requirements of the contract documents. Provide certification that the product and testing conforms with AS/NZS 4680.

If a higher level of quality assurance is required refer to AS/NZS 4680, Appendix B, for different means of demonstrating conformance. Check with galvanizer as to suitability.

2. PRODUCTS

Materials

2.1 GALVANIZED COATING

Zinc coating by the hot-dip process to the requirements of AS/NZS 4680 and AS/NZS 2312.2

2.2 BOLTS, NUTS AND WASHERS

Hot-dip galvanize to AS/NZS 4680 and AS/NZS 2312.2, bolts, nuts and washers forming a permanent part of a structure subject to a protective coating.

2.3 BOLTS, NUTS AND WASHERS - DRY INTERNAL USE

Electrogalvanize to AS 1897 or hot-dip galvanize to AS/NZS 4680.

3. EXECUTION

Conditions

3.1 GENERALLY

The galvanized coating on all steel articles shall conform to the requirements of AS/NZS 4680 and AS/NZS 2312.2, as specified.

3.2 DEFECTS

Discard any material or fabricated items showing defects affecting its structural integrity.

3.3 SURFACE PREPARATION

Grind off burrs, welding slag and sharp arrises and all other defects that could affect appearance.

Take care to avoid fabrication techniques that could cause distortion or embrittlement of the steel. Holes and/or lifting lugs to facilitate handling, venting and draining during the galvanizing process shall be provided at positions as agreed between engineer and galvanizer. Unsuitable marking paints to be avoided.

Architectural exposed steelwork may warrant more stringent specification.

Galvanizing

3.4 STEELWORK BEING GALVANIZED

Clean sections thoroughly and apply zinc coating by the hot-dip process to the requirements of AS/NZS 4680. Zinc coating thickness to SELECTIONS, but not less than the following from AS/NZS 4680, Table 1 and Table 2:

Structural steelwork	**Average coating**	**Minimum coating**	**Average Mass**
≤ 1.5mm	45 microns	35 microns	320 g/m²
> 1.5mm - ≤ 3mm	55 microns	45 microns	390 g/m²
> 3mm - ≤ 6mm	70 microns	55 microns	500 g/m²
> 6mm	85 microns	70 microns	600 g/m²
Bolts and washers			
Bolts and washers (exposed or corrosive environment)	85 microns	70 microns	600 g/m²
Bolts and washers (centrifuged and internal) <8mm	35 microns	25 microns	250 g/m²
Bolts and washers (centrifuged and/or internal) ≥8mm	55 microns	40 microns	390 g/m²

Bolts and washers are recommended at 600g/m² for the appropriate, exposed and other corrosive situations. This can be reduced for less corrosive environments. Although some existing standards use lesser levels, current recommendations are tending towards 600g/m². Do not specify a level for bolts and washers less than the structural steel.

Ensure that tolerances in screw cutting have made allowance for galvanizing.

Degrease and sweep abrasive blast using a non metallic media galvanized steelwork to be painted to NZS 4680, Appendix I, Information on the use of sweep (brush) blast cleaning of galvanized steel prior to painting

3.5 INSPECTION

Integrity of the coating to be determined by visual inspection and coating thickness measurement, to AS/NZS 4680.

For critical locations, with exposed or painted finish, all spikes to be removed and all edges free from lumps and runs.

Repairs

3.6 REPAIR GALVANIZING

All repairs to AS/NZS 4680, 8.2 to 8.4 **Repair requirements**:

- Small repairs:- Colour matched zinc rich paint.
- Large repairs:- With approval, colour matched zinc rich paint or other agreed option.

If the repairs are major, investigate other options including replacement.

3.7 REPAIR WELD DAMAGED GALVANIZING
For welds done after galvanizing, remove welding slag, power tool clean, grind off all burrs and sharp arrises, all repairs to AS/NZS 4680, 8.2 to 8.4 **Repair requirements**:
- Small repairs:- Colour matched zinc rich paint.
- Large repairs:- With approval, colour matched zinc rich paint or other agreed option.

Modify this clause If a particular technique is required.

Priming

3.8 PREPARATION, PRIMING AND PAINT SYSTEM
Refer to the painting section/s for preparation, primer and paint system.
Amend this clause to suit which section the primer and paint system are specified in.
In very high exposure zones or severe environments galvanized structural steel may need additional coatings to achieve the required 50 year life. Refer to AS/NZS 2312.2, tables 6.2 and 7.1 for guidance.

Completion

3.9 ENSURE
Ensure all elements are free of marks or blemishes.

3.10 REPLACE
Replace damaged, cracked or marked elements.

3.11 LEAVE
Leave work to the standard required by following procedures.

4. SELECTIONS

4.1 VENT & DRAIN HOLE LOCATION APPROVAL
Items that need approval for vent and drain hole locations.
Items: ~
Delete if not required.

4.2 GALVANIZED STEELWORK
Items: ~
System designation: HDG ~, minimum to AS/NZS 2312.2
Galv. avg. thickness: ~ microns - but not less than AS/NZS 4680, Table 1.
List items

Galvanizing systems - Expected min-max life (years)

System Designation		*HDG 390*	*HDG 500*	*HDG 600*	*HDG 900*
Galv avg thickness	*microns*	*55*	*70*	*85*	*125*
Galv avg mass	*g/m²*	*390*	*500*	*600*	*900*
Corrosive Cat. C1-C2	*life/years*	*>50+*	*>50+*	*>50+*	*>60+*
Corrosive Cat. C3	*life/years*	*26-78*	*33-100*	*40>100*	*60>100*
Corrosive Cat. C4	*life/years*	*13-26*	*16-33*	*20-40*	*30-60*
Corrosive Cat. C5	*life/years*	*6-13*	*8-16*	*10-20*	*15-30*
Corrosive Cat. CX	*life/years*	*2-6*	*2-8*	*3-10*	*5-15*

- *Notes:*
- *Table based on AS/NZS 2312.2, table 6.2. and provides an expected performance for ≤1.5mm structural steel, this can vary with steel thickness and condition, and micro-environments, refer to AS/NZS 2312.2 for more detail.*
- *Corrosive categories C1 to CX are from AS/NZS 2312.2, however C1 and C2 are not in AS/NZS 2312.2, table 6.2, as performance will always exceed 50 years plus.*
- *Steel thicknesses also determines minimum galvanizing thicknesses, so in this table minimum galvanizing thicknesses may need to be increased to meet minimum thickness for particular steel thickness, refer AS/NZS 4680, Table 1 (see below).*
- *Durability which is life to first maintenance is covered in AS/NZS 2312.2, table 6.2 and 6.3.1, but not included here.*
- *To extend the life of galvanizing additional paint coatings may be required, refer to AS/NZS 2312.2, table 7.1 for details.*

Minimum galvanizing thickness to steel thickness - AS/NZS 4680, Table 1

Structural steelwork	*Average coating*	*Minimum coating*	*Average Mass*

≤ 1.5mm	*45 microns*	*35 microns*	*320 g/m²*
> 1.5mm - ≤ 3mm	*55 microns*	*45 microns*	*390 g/m²*
> 3mm - ≤ 6mm	*70 microns*	*55 microns*	*500 g/m²*
> 6mm	*85 microns*	*70 microns*	*600 g/m²*

Note: The classification of Corrosion category in AS/NZS 2312.2:2014 roughly relate to Exposure Zones in NZS 3604 and NZBC E2/AS1 as follows:

CORROSION RISK	*AS/NZS 2312.2*	*NZS 3604*	*NZBC E2/AS1*
Very low	*C1*		
Low	*C2*	*B*	*B*
Medium	*C3*	*C*	*C*
High	*C4*	*D*	*D*
Very high	*C5 (includes C5I & C5M)*	*SED*	*E*
Extreme	*CX*	*SED*	*SED*
Tropical	*T*		