

0345P PPG COATINGS STEEL – PROTECTIVE PAINT COATINGS

Branded worksection

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Worksection abstract

This branded worksection *Template* is applicable to protective paint coating systems for the protection of steel products and structural steelwork against interior and exterior atmospheric corrosion using paint coating systems supplied by PPG COATINGS. It addresses surface preparation, preparation assessment and coating application for new and maintenance work.

Background

This worksection is not applicable where corrosion protection is neither necessary nor economically feasible, e.g. where anticipated corrosion rates are too low to compromise the structure or where sacrificial corrosion of sections has been allowed for in the selection of section thicknesses. AS/NZS 2312.1 clause 1.2 lists typical situations where coating for corrosion resistance is not required. For these cases consider the use of the *Optional* style text included in *0341 Structural steelwork*.

Guidance text

All text within these boxes is provided as guidance for developing this worksection and should not form part of the final specification. This *Guidance* text may be hidden or deleted from the document using the NATSPEC Toolbar or the hidden text *Hide* and *Delete* functions of your word processing system. For additional information visit FAQs at www.natspec.com.au.

Optional style text

Text in this font (blue with a grey background) covers items specified less frequently. It is provided for incorporation into *Normal* style text where it is applicable to a project.

Related material located elsewhere in NATSPEC

If a listed worksection is not part of your subscription package and you wish to purchase it, contact NATSPEC.

Related material may be found in other worksections. See for example:

- *0183 Metals and prefinishes* for prefinished steel, cross referenced by *0171 General requirements*.
- *0344 Steel – hot-dip galvanized coatings*.
- *0671 Painting* for decorative coatings.
- *0673 Powder coatings*.

Material not included in NATSPEC

Some projects may include items not covered by NATSPEC. For these you may need to create new text or modify this text or a suitable worksection. For example:

- Steel surface preparation by chemical conversion treatment to AS 1627.6.

Documenting this and related work

You may document this and related work as follows:

- Refer to *Guidance* in **SELECTIONS** for corrosivity zoning.
- Nominate the required protective paint coating to each steel member on the drawings or in **SELECTIONS**.

The *Normal* style text of this worksection may refer to items as being documented elsewhere in the contract documentation. Make sure they are documented.

Search acumen.architecture.com.au, the Australian Institute of Architects' practice advisory subscription service, for notes on the following:

- Guarantees and warranties.

Specifying ESD

The following may be specified by retaining default text:

- Waterborne coating systems instead of solvent borne systems for lower VOC emissions.
- Durable coatings appropriate to the corrosivity category to maximise steel life cycle.

The following may be specified by including additional text:

- Systems which have low hazard air pollutants (HAP) emissions.

Refer to the NATSPEC TECHreport TR 01 on specifying ESD.

1 GENERAL

PPG Industries' vision is to continue, through leadership in innovation, sustainability and colour, to help customers in industrial, transportation, consumer products, and construction markets and aftermarkets to enhance more surfaces in more ways. PPG operates in nearly 70 countries around the world.

1.1 RESPONSIBILITIES

The aim of the worksection is to document a protective coating system appropriate to the intended life of the steel products and structural steelwork to:

- Provide functionality and maintainability.
- Retain substrate integrity for the design life through successive maintenance paintings.
- Minimise the average cost of service for corrosion protection.
- Lower risk to personnel, the public and the environment.
- Minimise non-productive downtime or non-operational time due to corrosion or its effects.
- Retain or enhance aesthetics where appropriate.

Quality surface preparation and application of a good coating system provides the basis for protection over the life of the steel. The cheapest coating system may not be the best choice.

General

Requirement: Provide PPG Protective and Marine coatings for the protection of steel products and structural steelwork against interior and exterior atmospheric corrosion, as documented.

Documented is defined in 0171 General requirements as meaning contained in the contract documents.

Performance

Requirement: Control atmospheric corrosion to structural steelwork and steel products until the first scheduled maintenance.

Period from application to first scheduled maintenance: [complete/delete]

State period from date of application to first scheduled maintenance (which may be different to the warranty period). See also AS/NZS 2312.1 clause 1.7.

1.2 COMPANY CONTACTS

PPG COATINGS technical contacts

Website: www.ppgpmc.com

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

0171 General requirements contains umbrella requirements for all building and services worksections.

List the worksections cross referenced by this worksection. 0171 General requirements references the 018 Common requirements subgroup of worksections. It is not necessary to repeat them here. However, you may also wish to direct the contractor to other worksections where there may be work that is closely associated with this work.

NATSPEC uses generic worksection titles, whether or not there are branded equivalents. If you use a branded worksection, change the cross reference here.

1.4 STANDARDS

General

Surface preparation and coating: To AS/NZS 5131 Section 9 and the recommendations of AS/NZS 2312.1.

For guidance on steel corrosion and coatings refer to *Australian steelwork corrosion and coatings guide*.

1.5 MANUFACTURERS DOCUMENTS

Technical manuals

Website: www.ppgpmc.com

1.6 INTERPRETATION

Abbreviations

General: For the purposes of this worksection the following abbreviations apply:

- DFT: Dry Film Thickness.
- ITP: Inspection and Test Plan.
- MIO: Micaceous Iron Oxide.
- NACE: National Association of Corrosion Engineers (USA).
- PDS: Product Data Sheet.
- SDS: Safety Data Sheet.

Safe Work Australia defines a safety data sheet (SDS), previously called a material safety data sheet (MSDS) as a document that provides information on the properties of hazardous chemicals and how they affect health and safety in the workplace.

- μm : Micron (10^{-6}m).

Edit the **Abbreviations** subclause to suit the project or delete, if not required. List alphabetically.

Definitions

General: For the purposes of this worksection the definitions given in AS/NZS 2310 and the following apply:

- Coating contractor: The protective coatings application contractor conducting the on- or off-site coating application works.
- Coating manufacturer: The supplier and/or manufacturer of the protective coating materials used.
- Inspection and test plans (ITP): A series of formal inspection and test plans, prepared by the coating contractor to reflect the specific inspection and testing that will be carried out on the surface preparation, coating application and the record keeping tasks to be undertaken.

Edit the **Definitions** subclause to suit the project or delete, if not required. List alphabetically.

AS/NZS 2310 provides a comprehensive set of definitions for painting terms.

1.7 QUALITY ASSURANCE

Quality

ITPs: Submit for each proposed coating system.

Applicator's quality assurance officer: Nominate a qualified NACE certified coating inspector or an Australasian Corrosion Association (ACA) certified coatings technician under direction of a NACE inspector.

Records: Retain all test and application records and make available for inspection.

Verification: Nominate an independent NACE certified coating Inspector to carry out quality audits.

Defects: Submit detailed written inspector reports.

1.8 SUBMISSIONS

Execution details

Detailing features: If design and fabrication features of the items to be coated may lead to difficulties, identify these and submit details for improvement.

See AS/NZS 2312.1 Section 3. Figure 3.1 details typical design problems and how they can be addressed. Make sure that details do not have these problems.

Repair of damaged coating: If the protective coating is damaged, submit a coating repair proposal, based on PPG recommendations for reinstating the corrosion protection function of the system.

It is generally a requirement that repair and re-coating reinstates the coating to a uniform film.

Reinstatement: If final coat varies from the submitted sample, submit proposals for reinstatement of the visible final coating system.

Maintenance painting

Existing steelwork: Identify, itemise and submit details of areas of corrosion, damage and other degradation.

Recoating systems: Submit details of coating systems for maintenance painting of previously coated items and structural elements, including surface preparation.

Products and materials

Multi-component coatings: If partial mixing of packs is proposed, submit details.

Records

General: Prepare and maintain records of all surface preparation and coating application works, as follows:

- Standards: To AS 3894.10, AS 3894.11, AS 3894.12, AS 3894.13 and AS 3894.14.
- Reference the relevant parts of the ITP and record conformance.

Add project specific requirements for records.

Samples

Painting and coating colour: Submit a 400 x 400 mm sample of the finished product for each coating system.

Retention: Retain samples for comparison during application.

Customise to suit.

Subcontractors

General: Submit names and contact details of proposed suppliers and applicators.

Evidence of experience: [complete/delete]

Delete if supplier/applicator details are not required.

Requirement: Submit proof of currency of the applicator's environmental operating licence.

An environmental operating licence may be required by the client for a specific project. Delete if not required.

Substrate acceptance: Submit evidence of applicator's acceptance of the coating substrate before starting installation.

Warranties

General: Submit details of PPG warranty terms, form and period.

1.9 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Items after fabrication, before commencing surface cleaning and preparation.
- Surfaces after preparation, before application of first coating.
- Coating stages:
 - . After application of primer or seal coats.
 - . After application of each subsequent coat.
- Repair of coating damage: Exposure of corrosion pitting or significant metal loss by blasting process.

Amend to suit the project adding critical stage inspections required.

Hold points, if required, should be inserted here. These could include measurement of the total DFT of each coating and checking for defects such as misses, cracking and blistering or rectification of abrasive blasted substrate cleanliness, primer coat and finish coat DFTs.

2 PRODUCTS**2.1 GENERAL****Product substitution**

Other products: Conform to **PRODUCTS, GENERAL, Substitutions** in *0171 General requirements*.

The *0171 General requirements* clause sets out the submissions required if the contractor proposes alternative products. Refer also to NATSPEC TECHnote GEN 006 for more information on proprietary specification.

Storage and handling

Requirement: Handle, store, mix and apply all protective coatings in conformance with the manufacturer's recommendations.

Original containers: Deliver coating products to site in manufacturer's labelled and sealed containers.

Ambient temperature range for storage: 3°C to 30°C, or to PPG recommendations.

Sunlight: Protect coating materials from direct sunlight before mixing or adding the converter (catalyst).
 Use-by-date: Use products with limited shelf life before their use-by-date, unless written authorisation from PPG technical services section is provided.

For storage, handling and transport of coated items, refer to AS/NZS 2312.1 clause 10.2.6 and AS/NZS 5131 clause 9.9.19.

Paint material

Requirement: To AS/NZS 5131 clause 9.9.3.

Proprietary products

Requirement: Provide all products from the one manufacturer's supply.

Product data sheets (PDS): Keep on site copies of all relevant PPG PDS.

Refer to AS/NZS 5131 clause 9.9.5 (i).

Safety data sheets (SDS): Keep on site copies of all relevant PPG SDS.

Recording: To AS/NZS 5131 clause 9.9.5.

3 EXECUTION

3.1 GENERAL

Product warnings

Requirement: Conform to the PPG PDS and SDS.

Surroundings

Protection: Prevent the release of abrasives, overspray or paint waste debris into the air, ground or to any watercourse. Prevent damage to other assets, services or equipment.

Reinstatement: Repair and/or clean affected surrounding areas.

Working area

General: Perform all painting under cover and/or protected from rain, condensation, dew, excessive wind, overspray or wind-blown dust.

Period: Continue protection where any of these conditions exist until the coating is no longer affected.

This principally relates to conditions during the night, after coating application.

3.2 SURFACE PREPARATION

Correct surface preparation is vital if the coating system is to perform to its maximum potential.

General

Requirement: Conform to AS/NZS 5131 clauses 9.3, 9.4 and 9.5.

If any additional requirements to those documented in AS/NZS 5131 are necessary on a project, document such requirements here. Examples of which may be additional requirements for enclosed or sealed spaces, surfaces in contact with concrete and weather resistant steel surfaces.

For removal of oil, grease and related contaminants, see AS 1627.1. For power tool cleaning, see AS 1627.2. For Abrasive blast cleaning, see AS 1627.4. For chemical conversion treatment surface preparation, see AS 1627.6.

Treatment grade to AS/NZS 5131: [complete/delete]

Nominate required treatment grade. See AS/NZS 5131 clauses 4.1.3 and 9.8.4 to determine the treatment grade (P1 to P3). Generally, treatment grade P2 applies for painting. Treatment grade P3 would generally apply for AESS.

The treatment grade is related to the expected life of the corrosion protection and may be related to the type of corrosion protection system used.

A treatment grade may apply to the whole structure or to a part of the structure or to specific details. If more than one treatment grade is applicable to the project, consider using a schedule in **SELECTIONS** to document the project treatment grades.

Galvanized, aluminium and zinc primed surfaces

Requirement: Remove grease, oil and other solvent-soluble contaminants to AS 1627.1. Allow to dry and immediately proceed with the next operation.

Galvanized and aluminium surfaces: Abrade surfaces to a medium coarse type finish to provide an adhesion key.

Zinc primed surfaces: If present, remove zinc salts from zinc primers.

Treatment of welds

Requirement: Clean welds to remove roughness, using power tools to AS 1627.2. Remove filings by vacuuming or compressed air.

Temporary welds: Grind flush any temporary welds.

Porous, skip or stitch welds: Not permitted.

If intermittent welds have been used, document any requirements sealing of welds here.

Site welding: If possible, avoid site welding. If on site welding is required, prepare and treat the weld to AS/NZS 5131 clause 9.12.2.

Shop priming

Requirement: Dust off and apply a coat of primer in conformance with the manufacturer's recommendations.

Refer also to AS/NZS 5131 clause 9.9.11.

Site coating

General: High pressure wash down all surfaces with clean water. Lightly sand down primer/intermediate coats, which have been shop applied, before site application of next coat.

3.3 PREPARATION ASSESSMENT**General**

Conformance: Assess all surfaces of each steel member for conformance with the documented preparation requirements.

Abrasive blast cleaning

Assessment: To AS 1627.4 and AS 1627.9.

AS 1627.9 is essentially a reference to ISO 8501-1 which contains visual and descriptive examples of the various classes of finish available.

Minimum acceptance class: [complete/delete]

State To AS/NZS 5131 or nominate required class, e.g. Sa 2.5.

Mechanical cleaning

Assessment: To AS 1627.9.

AS 1627.9 refers to ISO 8501-1 which contains visual and descriptive examples of the various classes of finish available.

Minimum acceptance class: [complete/delete]

State to AS/NZS 5131 or nominate required class, e.g. St 2.

Surface profile

General: To AS 3894.5 Method A.

The surface profile or anchor pattern is measured using an agreed standard or instrument in conformance with AS 3894.5. This can be done using the Testex Profile Tape. Re-blasting of steel to remove old coatings will generally result in a lower surface profile on subsequent treatments.

Acceptable profile range: [complete/delete]

A surface profile of 40 to 75 µm (AS/NZS 5131 clause 9.4.4) is usually acceptable for atmospheric coating systems.

Surface dust from abrasion

General: To AS 3894.6 Method C.

Rating criteria for rejection of surface treatment: [complete/delete]

AS 3894.6 Method C has ratings ranging from Rating 0 (excellent) to Rating 5 (grossly contaminated).

Chloride level testing

Test: To AS 3894.6 Method A.

Maximum allowable chloride levels: 50 mg/m² for critical applications (heavy condensation, fresh water ponding or immersion) or to manufacturer's recommendations.

Conformance: If the maximum allowable chloride is exceeded, rewash the affected surface area until the chloride level is within the acceptable limits using clean water or chloride neutralising solutions. Jet-washing or steam cleaning is also acceptable before re-testing and re-abrasive blasting.

Timing of testing: Early in the blasting work so that removal procedures can be started before the blasting is completed.

Delete if procedure/testing is not required. Generally, for inland locations, it is not required unless a specific micro environment exists. Advice on acceptability should be obtained from the coating manufacturer.

If testing for oil or water droplet contamination is required, make reference to AS 3894.6 Method B. If testing for the presence of ferrous soluble salts (refer to AS/NZS 2312.1 clause 4.3 for more information) is required, make reference to AS 3894.6 Method D. If AESS has been specified and prepared to grade St 3 or to class Sa 3 and testing for the presence of mill scale is required, make reference to AS 3894.6 Method E.

3.4 MIXING

General

Requirement: To AS/NZS 5131 clause 9.9.6.

Powered agitators: Mix package sizes larger than 4 litres using powered agitators driven by air motors.

Multi-component coatings: Combine as whole pack units before application.

Thinners: If addition of thinners is proposed, conform to the coating manufacturer's recommendations for the documented product.

Only use proprietary solvents in protective coatings. Generic solvents are unacceptable.

Colour consistency: If colour consistency is required, pre-mix tinted products, before the addition of the curing agent or converter and before coating application.

See AS/NZS 5131 clause 9.9.8 for requirements regarding the tinting of successive coats of the same product.

3.5 COATING APPLICATION

Starting the application is deemed to mean that the coating contractor has accepted that the coating product and its colour are correct. The coating manufacturer will not take responsibility for incorrectly coloured coating applied on items without the coating contractor having carried out a colour confirmation.

General

Requirement: Conform to PPG PDS, AS/NZS 5131 clause 9.9 and **SELECTIONS, PPG PROTECTIVE PAINT COATING SYSTEMS**.

Painting and coating colour: Verify all project finish colours with the retained samples.

Final surface preparation or coating application

Limits: If the environmental/climatic/substrate conditions listed in AS/NZS 5131 clause 9.9.10 and the following are present do not apply coating:

- Ambient air temperature below 5°C or above 40°C.

Refer to manufacturer's recommendations and revise limits if necessary. AS/NZS 5131 nominates the lower limit of 5°C. Ideal temperatures for painting are between 15°C and 30°C.

- Substrate temperature below 5°C or above 35°C.

Refer to manufacturer's recommendations and revise limits if necessary. Different coating types have different acceptable and optimum limits for substrate temperature. Refer also to AS/NZS 2312.1 Table 7.1 for guidance.

- Full prime coat application cannot be carried out before the specified cleanliness of the surface deteriorates.
- Surface preparation standard has not been achieved.
- Time between final surface preparation and the commencement of coating has exceeded 4 hours.
- Visual tarnishing or black spots develop on the surface of the steel.

Exception: Preliminary blast or other surface preparations may be performed in conditions that are outside the limits, providing the final surface preparation and all coating applications are undertaken under the limit conditions.

Vary to suit the fabrication sequence.

Pre-coating: Before the spray application of each coating, stripe coat by brush method all edges, welds, seams, rivets, bolts, boltholes (including slots) and difficult to spray areas. Prime the underlying surfaces of replacement bolting, washers and nuts before installation.

This will assist in achieving adequate DFT at areas where premature coating failure has been known to occur.

Procedure: Conform to the coating order shown in **SELECTIONS, PPG PROTECTIVE PAINT COATING SYSTEMS**.

Subsequent coats: Before applying any subsequent coating layer, make sure the surface condition of the preceding coat conforms to **SELECTIONS, PPG PROTECTIVE PAINT COATING SYSTEMS** and is clean and free from defects.

Wet film thickness (WFT)

Method of measurement: To AS 3894.3 Appendix C using an approved wet film gauge continuously during application.

This minimises the possibility of low DFT and makes sure film build-up is consistent. Wet film thickness gauges can leave test marks in the coating which may require repair.

Dry film thickness (DFT)

Method of measurement: To AS 3894.3 clause 10.

AS 3894.3 clause 10 covers magnetic induction and eddy current methods.

Extent: Measure all surfaces at the completion of each prime, intermediate and finish coats, including areas of the element difficult to paint, masked by structure, or where double or light coating is likely.

Number of measurements: To AS 3894.3 clause 7.

Coatings with DFT 150 µm or less: If testing, deduct the effect of the measured surface profile from all DFT readings.

Single readings: Conform to the following:

- The average of 5 point readings for each 10 m² area of coating surface to be within the documented coating thickness range.
- No single point reading in any 10 m² to be less than 80% of the specified minimum coating thickness. If the average of three readings is used to produce a point reading, an individual reading may be less than 80% of the minimum coating thickness.
- Check any single reading that is greater than 150% of the documented maximum DFT with three additional readings within 50 mm of the original reading. If the average of these three readings is not greater than 150% of the specified DFT, take the average reading as the point reading. If greater than 150%, reject the DFT for that area. If no maximum limit for DFT is documented, consult manufacturer.

If other testing such as measurement of film continuity to AS 3894.1 or AS 3894.2 or assessment of degree of cure to AS 3894.4 is necessary, include requirements here. Refer to manufacturer's recommendations.

Rectification and defects

Rectification: Re-work areas rejected, using the same surface preparation, coatings and sequence as for the original work.

Refer to AS/NZS 5131 clause 9.12.1.

Defects (including under-thickness and over-thickness): Mark with dustless chalk, adhesive inspection labels or masking tape. Do not use crayon, paint or spirit based ink pens.

Defects for rejection: [complete/delete]

Nominate defects which may be grounds for rejection, for example, dry spray, splatter, inclusions, lumps, excessive orange peel or other visually unattractive defects.

3.6 PROTECTION

Contamination

Surfaces: Prevent contamination of coated surface, which are not yet dry, from blasting dust, abrasive or surface preparation debris and any other foreign matter.

Post application care

General: Protect the coating against physical, chemical, or atmospheric damage until all components are fully cured.

Care: Stack and handle all coated items using fabric slings or padded chains. Use soft packaging, carpet strips or other deformable materials between all coated items.

Water ponding: Stack coated items to prevent water ponding.

3.7 COATING REPAIR

Coatings that become damaged need to be repaired to the coating manufacturer's recommendations for repair or recoating. As a minimum, damaged coatings need to be abraded back by hand sanding, mechanical grinding with abrasive discs or be abrasive spot and brush blast cleaned as necessary, depending on the surface area to be repaired. Repair coatings are applied

in the same sequence as first applied, i.e. primer, intermediate and finish coat by brush, roller or spray method as advised in the coating data sheet.

Repair of coating damage

Preparation: Feather back by hand or machine sanding all leading edges of intact coating adjacent to the repair, to remove any sharp edge.

Surface contamination: Remove by dusting or blowing down before applying the first coat of paint.

Sequence: Apply the repair coating in the same sequence and manner as the original coating.

Areas damaged without exposing the primer: Wash with a proprietary detergent solution, rinse with clean water and abrade so that edges of sound paint are feathered. Coat the area with the appropriate intermediate and finishing coat materials.

Areas damaged exposing the primer or steel surface: Blast clean to the original standard. Prepare at least 50 mm into the sound coating and to a further feathering zone of approximately 50 mm. Recoat with the documented system to restore the film thickness and integrity over the whole prepared surface including the feathered zone.

Aesthetic reinstatement: If required, repaint to a physical or discernible boundary line.

Defects: If corrosion pitting or areas of significant metal loss and defects are exposed by the blasting process, advise for inspection and have areas passed as being fit for service before proceeding with the coating system.

Timing: Apply the protective coating system within 4 hours of blast cleaning or in any case before visual tarnishing of the steel occurs.

Surfaces left longer than 4 hours require blast cleaning before coating. Surfaces that develop visual tarnishing (red rust or black spots) at any time before coating require washing down with clean water, dousing with an approved chloride neutralising solution and then blast cleaning before coating.

3.8 COMPLETION

General

Joints: On completion, seal all joints and mating surfaces with a compatible polyurethane sealant.

This measure helps promote longer coating life.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.

Coatings manufacturers will not provide warranties for work carried out in accordance with generic specifications. Performance warranties, if required, must be discussed with the coatings manufacturer and be agreed on in writing before tender. Refer to AS/NZS 2312.1 clause 1.7 for an explanation of the differences between warranties, guarantees, coating durability and the period to the first scheduled maintenance, and an outline of considerations when specifying them.

Refer to NATSPEC TECHnote PRO 003 for information on warranties for steel protective paint coatings.

4 SELECTIONS

Schedules are a way of documenting a selection of proprietary or generic products or systems by their properties. Indicate their locations here and/or on the drawings. Refer to NATSPEC TECHnote GEN 024 for guidance on using and editing schedules.

4.1 PPG PROTECTIVE PAINT COATING SYSTEMS

It is recommended that protective paint coating systems be selected from the limited number of systems set out in the following tables which are based on a limited range of systems from AS/NZS 2312.1. Delete systems from the tables that are not required/selected.

Most buildings in Australia are located in close proximity to the coastal fringe. AS/NZS 2312.1 and AS 4312 rate these areas as atmospheric corrosivity categories C3, C4 and C5. All state capitals (except Canberra which is category C2) are in this zone. As a general rule, sites located 50 km from the coast or other source of salt water extending to inland and regional areas are rated atmospheric corrosivity categories C1 and C2. Micro environment may also play a part. If in doubt, check with PPG.

Refer to NATSPEC TECHnote DES 010 on atmospheric corrosivity categories for ferrous products.

Refer to AS 4312 in conjunction with AS/NZS 2312.1 to determine the site specific corrosivity zones.

These options are not exhaustive but aim to provide for over 80% of the steel coating requirements. Consult the Australian Paint Manufacturer's Federation (APMF) Technical Committee or PPG for more information.

Once the particular corrosion environment is identified for each structure or component, select an appropriate coating system. Refer to AS/NZS 2312.1 Appendix C for corrosion factors of steelwork to be immersed in water, buried in soil or exposed to other than the environments nominated, and for examples of other protective coatings systems. Refer to PPG for systems for particular environments.

Reasons for protective paint coatings

Generally, there are four zones in a building that require protection and or decoration. These are:

- Interior non-decorative. (Such as inside the roof space or other interior areas where visual decoration is not important.)
- Interior decorative.
- Exterior non-decorative. (This may be inside an awning or the structure supporting roof plant where appearance is secondary to protection.)
- Exterior Decorative.

The following tables provide practical information for each of these 4 zones with a choice of decorative finishes normally associated with steel. Wherever possible a cross reference to AS/NZS 2312.1 is provided but in some cases the limiting scope of AS/NZS 2312.1 does not allow for alternatives.

The more common decorative finish options for architectural and structural steelwork are:

- Polyurethane: Polyurethane as a top coat gives a high gloss finish with excellent exterior durability combined with gloss and colour retention and chalk resistance. Application can be by brush, roller or spray. It has good touch-up properties and is available in a wide range of colours.
- Micaceous Iron Oxide (MIO) type finishes: MIO pigments impart increased durability, weathering and corrosion resistance because of the lamellar structure of the pigment particles. Some manufacturers provide a MIO type finish in traditional-low gloss (e.g. bridges) and also high-low gloss versions. The main advantage of the high gloss versions is a single coat finish, providing an effect which is normally only achieved using a base coat/clear coat type system. They can also be used to provide a wet paint effect similar to new galvanizing without the aesthetic deterioration normally seen in such systems. Some MIO finishes can show colour and texture variations, particularly with touch-up and brush or roller application.
- Catalysed acrylic: Catalysed acrylic is an isocyanate-free replacement for polyurethane coatings. It provides a smooth glossy finish available in a wide choice of colours and has good graffiti resistance. It is difficult to apply on site by brush and roller as it dries very fast and can sometimes have adhesion problems, if the underlying coat is over cured.
- Industrial silicone enamel: Silicone enamel is the most recent innovation in alkyd-enamel technology. It will provide a smooth glossy surface finish very economically. Silicone enamel differs from normal enamel in its ability to resist chalking. It is ideally suited to application by brush and roller on-site and may be sprayed on site, if permitted. Enamel coatings will not provide long term performance in atmospheric corrosivity categories C3, C4 and C5. A wide range of colours is available such as those set out in AS 2700 and in the manufacturer's colour range. Confirm choice of primer and it's durability with the manufacturer.

Polyurethane – AS/NZS 2312.1 Categories C1 and C2 table

Location	Primer	Second Coat
Interior non-decorative	75µm SigmaCover 256 or SigmaCover 280	
Internal decorative	75µm SigmaCover 256 or SigmaCover 280	50µm SigmaDur 550
External non-decorative conforming to AS/NZS 2312.1 PUR 2	75µm SigmaCover 256 or SigmaCover 280	50µm SigmaDur 550 or 50µm Amersshield
External decorative conforming to AS/NZS 2312.1 PUR2	75µm SigmaCover 256 or SigmaCover 280	50µm SigmaDur 550 or 50µm Amersshield
External decorative conforming to AS/NZS 2312.1 PUR2a	75µm SigmaZinc 471 or SigmaZinc 109HS	75µm Amersshield

Polyurethane – AS/NZS 2312.1 Categories C3, C4 and C5 table

Location	Primer	Second Coat	Third Coat
Interior non-decorative	75µm SigmaZinc 471 or SigmaZinc 109HS		
Internal decorative conforming to	75µm SigmaZinc 471 or SigmaZinc 109HS	75µm Amersshield	

Location	Primer	Second Coat	Third Coat
AS/NZS 2312.1 PUR2a			
External non-decorative conforming to AS/NZS 2312.1 EHB4	75µm SigmaZinc 471 or SigmaZinc 109HS or Amercoat D9	200µm Amerlock 400 or Amerlock 2K	
External decorative	75µm SigmaZinc 471 or SigmaZinc 109HS or Amercoat D9	200µm Amerlock 400 or Amerlock 2K	50µm SigmaDur 550

Anti-Graffiti and Polysiloxane – AS/NZS 2312.1 Categories C1 and C2 table

Location	Primer	Second Coat
Internal decorative	75µm SigmaZinc 471 or SigmaZinc 109HS	125µm PSX700
External decorative PSL1	75µm SigmaZinc 471 or SigmaZinc 109HS	125µm PSX700

Anti-Graffiti and Polysiloxane – AS/NZS 2312.1 Categories C3, C4 and C5 table

Location	Primer	Second Coat	Third Coat
Internal decorative	75µm SigmaZinc 471 or SigmaZinc 109HS	125µm PSX700	
External decorative conforming to AS/NZS 2312.1 PSL1	75µm SigmaZinc 471 or SigmaZinc 109HS	125µm PSX700	
External decorative conforming to AS/NZS 2312.1 PSL2	75µm SigmaZinc 471 or SigmaZinc 109HS	175µm SigmaPrime 200	75µm PSX700
External decorative conforming to AS/NZS 2312.1 PSL3	75µm SigmaZinc 471 or SigmaZinc 109HS	200µm SigmaPrime 200	75µm PSX700

Micaceous Iron Oxide – AS/NZS 2312.1 Categories C3, C4 and C5 table

Location	Primer	Second Coat	Third Coat
External non-decorative conforming to AS/NZS 2312.1 EHB4	75µm SigmaZinc 471 or SigmaZinc 109HS or Amercoat D9	200µm Amerlock 400 MIO or Amerlock 2K MIO	
External decorative conforming to AS/NZS 2312.1 EHB6	75µm SigmaZinc 471 or SigmaZinc 109HS or Amercoat D9	125µm Amerlock 400 MIO or Amerlock 2K MIO	125µm Amerlock 400 MIO or Amerlock 2K MIO

Epoxy Acrylic – AS/NZS 2312.1 Categories C1 and C2 table

Location	Primer	Second Coat
Interior non-decorative	75µm SigmaCover 256 or SigmaCover 280	
Internal decorative	75µm SigmaCover 256 or SigmaCover 280	50µm SigmaDur 540 or Iso Free 977
External non-decorative conforming to AS/NZS 2312.1 ACC2	75µm SigmaCover 280 or SigmaCover 256	50µm SigmaDur 540 or Iso Free 977
External decorative conforming to AS/NZS 2312.1 ACC2	75µm SigmaCover 280 or SigmaCover 256	50µm SigmaDur 540 or Iso Free 977

Epoxy Acrylic – AS/NZS 2312.1 Categories C3, C4 and C5 table

Location	Primer	Second Coat	Third Coat
Interior non-decorative	75µm SigmaZinc 471 or SigmaZinc 109HS		
Internal decorative	75µm SigmaZinc 471 or SigmaZinc 109HS	50µm SigmaDur 540 or Iso Free 977	
External non-decorative conforming to AS/NZS 2312.1 EHB4	75µm SigmaZinc 471 or SigmaZinc 109HS or Amercoat D9	200µm Amerlock 400 MIO or Amerlock 2K MIO	
External decorative conforming to AS/NZS 2312.1 ACC6	75µm SigmaZinc 471 or SigmaZinc 109HS or Amercoat D9	200µm Amerlock 400 MIO or Amerlock 2K MIO	50µm SigmaDur 540 or Iso Free 977

Steel protection – Inorganic Zinc Silicate – AS/NZS 2312.1 Categories C1 to C5 table

Location	Primer
Interior non-decorative	75µm of Amercoat D9
External non-decorative conforming to AS/NZS 2312.1 IZS1	75µm of Amercoat D9
External non-decorative conforming to AS/NZS 2312.1 IZS4	125µm of Amercoat D9

Galvanized (HDG) steel – AS/NZS 2312.1 Categories C2 table

Location	Primer	Second Coat
Internal decorative	75µm SigmaCover 280	100µm Amershield
External decorative	75µm SigmaCover 280	100µm Amershield

Galvanized (HDG) steel – AS/NZS 2312.1 Categories C3, C4 and C5 table

Location	Primer	Second Coat	Third coat as required
Decorative System 2D AS/NZS 2312.2	75µm SigmaCover 280	100µm Amershield or upgrade to 100µm PSX700	
Wear & Tear industrial System 3I AS/NZS 2312.2	75µm SigmaCover 280	150µm Amerlock 400 MIO or Amerlock 2K MIO	
Protective Long term decorative System 4D AS/NZS 2312.2	250µm Amerlock 400 MIO or Amerlock 2K MIO	100µm Amershield or upgrade to 100µm PSX700	
Protective Long term decorative System 5D AS/NZS 2312.2	75µm SigmaCover 280	225µm Amerlock 400 MIO or Amerlock 2K MIO	100µm Amershield or upgrade to 100µm PSX700
Protective Long term industrial System 5I AS/NZS 2312.2	75µm SigmaCover 280	325µm SigmaShield 880 MIO	

Alkyd – AS/NZS 2312.1 Categories C1, C2 and C3 table

Location	Primer	Second Coat
Interior non-decorative conforming to AS/NZS 2312.1 ALK 1	40µm Sigmarine 28	

Location	Primer	Second Coat
Internal decorative conforming to AS/NZS 2312.1 ALK 1	40µm Sigmarine 28	40µm Sigmarine 48
External non-decorative conforming to AS/NZS 2312.1 ALK 3	75µm Sigmarine 28	40µm Sigmarine 48

Moisture cured urethane (MCU) - AS/NZS 2312.1 - Single pack system - Severe environment

Location	Primer	Second Coat	Third Coat
External decorative conforming to AS/NZS 2312.1 MCU1	50µm MC PrepBond	75µm MC Miomastic	75µm MC Luster
External decorative conforming to AS/NZS 2312.1 MCU2	75µm MC Zinc	75µm MC Miomastic or 75µm MC Ferrox B	75µm MC Luster or 75µm MC Ferrox A

Intumescent - Fire protection of structural steel

Location	Primer	Second Coat	Third Coat
Fire Protection	Dependant on system specification	200µm - 1000µm SteelGuard 851	Topcoat as required to match project specification

The dry film thickness (DFT) varies according to the fire-resistance requirements and steel configuration.

4.2 SCHEDULES

Protective paint coating schedule

If one of the protective paint coating systems detailed in **PPG PROTECTIVE PAINT COATING SYSTEMS** is suitable, use this **Schedule**.

Property	PC1	PC2	PC3
Atmospheric corrosivity category to AS/NZS 2312.1			
Level/grids/reference			
Protective paint coating system			
Location			
Chloride level testing			
Colour (To AS 2700)			

PC1, PC2 and PC3: These designate each instance or type or location of the item scheduled. Edit to align with the project's codes or tags.

Edit codes in the **Schedule** to match those on drawings.

Atmospheric corrosivity category to AS/NZS 2312.1: Select C1 and C2 **or** C3, C4 and C5.

Level/grid/reference: Describe the location.

Protective paint coating system: Select from **PPG PROTECTIVE PAINT COATING SYSTEMS** to suit the corrosivity category, e.g. Polyurethane AS/NZS 2312.1 Categories C1 and C2.

Location: Select from Interior non-decorative, Interior decorative, Exterior non-decorative, Exterior decorative.

Chloride level testing: Required or not required.

Colour: The selection of colours for service pipes and identification of hazards may require reference to AS 1345 and AS 1318.

Some important points to note

There are some aspects that need to be reviewed and agreed between different parties during the early stages of the project which if unresolved are likely to affect the quality or performance of the protective coating system. These include:

- The coating specification.
- Work Health and Safety.
- Permit to work (hot and cold weather).
- Emergency Evacuation, Assembly Points, First Aid.
- Lines of communication between the contractor, inspector, project manager and the owner.
- ITP Hold points.
- Inspection methods and equipment to be used.
- Coating repair.
- Warranties, if applicable.
- Site transport regulations.
- Security issues.

General

Attention to detail in design, fabrication and coating is vital for a quality job.

Seek confirmation from PPG to make sure that your system is suitable for your requirements.

Variations

Premature coating failure is almost guaranteed when under-qualified people modify or deviate from a coating specification. From time to time changes in the specification are required for some reason. Always consult PPG for advice before allowing changes to your documentation. When seeking information from any source be sure to provide specific information and insist on a response in writing.

Galvanizing

Steel which has had galvanizing applied should not be coated if long life performance and decoration are required. It is the recommendation of the APMF that if galvanizing is used as the primary corrosion protection it is best left un-top coated. There are however times where coating is unavoidable. Coatings for galvanized steel are covered in *0671 Painting* by reference to AS/NZS 2311 Table 5.1 and 5.2

REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

AS 1627		Metal finishing - Preparation and pretreatment of surfaces
AS 1627.1	2003	Removal of oil, grease and related contamination
AS 1627.2	2002	Power tool cleaning
AS 1627.4	2005	Abrasive blast cleaning of steel
AS 1627.9	2002	Pictorial surface preparation standards for painting steel surfaces
AS/NZS 2310	2002	Glossary of paint and painting terms
AS/NZS 2312		Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings
AS/NZS 2312.1	2014	Paint coatings
AS/NZS 2312.2	2014	Hot dip galvanizing
AS 2700	2011	Colour standards for general purposes
AS 3894		Site testing of protective coatings
AS 3894.3	2002	Determination of dry film thickness
AS 3894.5	2002	Determination of surface profile
AS 3894.6	2002	Determination of residual contaminants
AS 3894.10	2002	Inspection report - Daily surface and ambient conditions
AS 3894.11	2002	Equipment report
AS 3894.12	2002	Inspection report - Coating
AS 3894.13	2002	Inspection report - Daily
AS 3894.14	2002	Inspection report - Daily painting
AS/NZS 5131	2016	Structural steelwork - Fabrication and erection

The following documents are mentioned only in the **Guidance** text:

AS 1318	1985	Use of colour for the marking of physical hazards and the identification of certain equipment in industry
AS 1345	1995	Identification of the contents of pipes, conduits and ducts
AS 1627		Metal finishing - Preparation and pretreatment of surfaces
AS 1627.6	2003	Chemical conversion treatment of metals
AS/NZS 2311	2009	Guide to the painting of buildings
AS 3894		Site testing of protective coatings
AS 3894.1	2002	Non-conductive coatings - Continuity testing - High voltage ('brush') method
AS 3894.2	2002	Non-conductive coatings - Continuity testing - Wet sponge method
AS 3894.4	2002	Assessment of degree of cure
AS 4312	2008	Atmospheric corrosivity zones in Australia
AS1 Corrosion	2015	Australian steelwork corrosion and coatings guide
NATSPEC DES 010	2009	Atmospheric corrosivity categories for ferrous products

NATSPEC GEN 006	2007	Product specifying and substitution
NATSPEC GEN 024	2015	Using NATSPEC selections schedules
NATSPEC PRO 003	2012	Warranties for steel protective coatings
NATSPEC TR 01	2016	Specifying ESD
ISO 8501		Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness
ISO 8501-1	2007	Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings