



Assets Planning and Delivery Group
Engineering

DESIGN STANDARD DS 95

**Selection, Preparation, Application, Inspection and Testing of
Protective Coatings on Water Corporation Assets**

VERSION 4
REVISION 1

DECEMBER 2024

FOREWORD

The intent of Design Standards is to specify requirements that assure effective design and delivery of fit for purpose Water Corporation infrastructure assets for best whole-of-life value with least risk to Corporation service standards and safety. Design standards are also intended to promote uniformity of approach by asset designers, drafters and constructors to the design, construction, commissioning and delivery of water infrastructure and to the compatibility of new infrastructure with existing like infrastructure.

Design Standards draw on the asset design, management and field operational experience gained and documented by the Corporation and by the water industry generally over time. They are intended for application by Corporation staff, designers, constructors and land developers to the planning, design, construction and commissioning of Corporation infrastructure including water services provided by land developers for takeover by the Corporation.

Nothing in this Design Standard diminishes the responsibility of designers and constructors for applying the requirements of the Western Australia's Work Health and Safety (General) Regulations 2022 to the delivery of Corporation assets. Information on these statutory requirements may be viewed at the following web site location:

[Overview of Western Australia's Work Health and Safety \(General\) Regulations 2022 \(dmirs.wa.gov.au\)](https://dmirs.wa.gov.au)

Enquiries relating to the technical content of a Design Standard should be directed to the Senior Principal Engineer, Asset Durability Section, Engineering. Future Design Standard changes, if any, will be issued to registered Design Standard users as and when published.

Head of Engineering

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Any interpretation of anything in the Standards/Specifications that deviates from specific Water Corporation Project requirements must be referred to, and resolved by, reference to and for determination by the Water Corporation's project manager and/or designer for that particular Project.

DISCLAIMER NOTICE: All coating products that are listed in DS95 Appendix 3 and proposed new products for use in contact with drinking water must be listed in Department of Health – Materials, products and substances in contact with drinking water – Schedule 5 Approved Materials, and subject to evaluation and written approval by Water Corporation Water Quality Branch complying to ADWG Guidelines prior to use UNTIL FURTHER NOTICE.

REVISION STATUS

The revision status of this standard is shown section by section below:

| REVISION STATUS | | | | | | |
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ABBREVIATIONS

Paint/Coating Associations

| | |
|--------|--|
| ACA | Australasian Corrosion Association |
| ANSI | American National Standards Institute |
| AS/NZS | Australian Standards |
| ASTM | ASTM International |
| ISO | International Standards Organisation |
| NATA | National Association of Testing Authorities |
| NACE | National Association of Corrosion Engineers |
| NSF | National Sanitation Foundation |
| SSPC | Society for Protective Coatings (Formerly Steel Structures Painting Council) |

Corrosion/Coating Abbreviations

| | |
|------|--------------------------|
| CP | Cathodic Protection |
| CS | Carbon steel |
| DFT | Dry Film Thickness |
| GRP | Glass Reinforced Plastic |
| HDG | Hot-Dip Galvanised |
| GF | Glass Flake |
| ITP | Inspection and Test Plan |
| UHB | Ultra-High Build |
| NDT | Non-Destructive Testing |
| TDFT | Total Dry Film Thickness |
| µm | Micron |
| WFT | Wet Film Thickness |

Basic coating Formulas

| | | |
|--|---|--|
| WFT (microns) | = | DFT x 100 ÷ % Volume Solids |
| WFT (microns) | = | DFT x (100 + % thinner added) ÷ % Volume Solids |
| Theoretical Coverage (m ² /litre) | = | $\frac{\% \text{ volume solids} \times 10}{\text{DFT (microns)}}$ |
| WFT (microns) | = | $\frac{1000}{\text{Coverage (m}^2\text{/litre)}}$ |
| % Volume Solids | = | $\frac{\text{DFT (microns)} \times \text{Coverage (m}^2\text{/litre)}}{10}$ |
| Amount of Paint (Litres) | = | $\frac{\text{Area (m}^2\text{)}}{\text{Coverage (m}^2\text{/litre)}}$ |
| Volume (Litres) | = | $\frac{\text{Area (m}^2\text{)} \times \text{DFT (microns)} \times 10}{\% \text{ Volume Solids} \times (100 - \% \text{ losses})}$ |

Basic conversions

Pressure

| | | |
|--------------|---|-----------|
| 1 psi | = | 6.9 kPa |
| 1 atmosphere | = | 101.3 kPa |
| 1 kPa | = | 0.145 psi |
| 1 MPa | = | 145 psi |

Linear

| | | |
|--------------|---|-------------|
| 1 mm | = | 1000 micron |
| 1 Thou (mil) | = | 25.4 micron |

DESIGN STANDARD DS 95

Selection, Preparation, Application, Inspection and Testing of Protective Coatings on Water Corporation Assets

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1 Scope

The scope of this standard is to provide Water Corporation designers, asset maintainers, design consultants and coating contractors with information to assist with the selection, design, monitoring and maintenance of coating systems for the conveyance, storage and treatment of potable and wastewater, and associated infrastructures.

The standard is intended to:

1. Ensure consistency in the application of coating systems on all relevant classes of assets.
2. Ensure that designs meet Water Corporation requirements and comply with relevant Australian Standards and International Standards.
3. Provide for standardisation of coating testing procedures including methods of recording and reporting results.
4. Provide consistency in the interpretation of coating measurement results thus minimising the possibility of errors, disputes of results and rework.
5. Provide procedures for personnel involved in the operation and maintenance of coating.

Promote co-operation between all interested parties through a common understanding of the complex principles and practices associated with coating applications.

This standard shall be used in conjunction with Water Corporation coating specifications Group A-M. This document also refers to, and shall be used in conjunction with, relevant Australian Standards (AS/NZS), International Standards Organisation (ISO), National Association of Corrosion Engineers/Association for Materials Protection and Performance (NACE/AMPP) and Society for Protective Coatings, formerly Steel Structures Painting Council (SSPC) standards.

For technical queries regarding coating issues, contact Team Leader– Asset Durability.

Table 1: Glossary of Terms

| Item | Description | Definition |
|------|----------------------------|---|
| 1 | Principal | Water Corporation * |
| 2 | Principal’s Representative | Nominated person(s) by the principal to act as the Principal’s Representative, on their behalf. |
| 3 | Contractor | Supplier / Subcontractor / Coating Applicator / Coating Contractor Design Engineer / Consultant / Construction Contractor Supplier / Vendor |
| 4 | Coating Inspector | Water Corporation’s approved Coating Inspector |

*For developer projects when Water Corporation is not the Principal and the works are to be handed over back to the Water Corporation, (e.g. Metronet / MRWA projects, etc.), the works will need to be conducted to Water Corporation’s project standards and specification.

1.1 Purpose of the Document

The asset designer pre-qualified painting contractor and asset maintainer shall use this document to specify, select and apply the appropriate coatings. If the designer, applicator or maintainer intends to deviate from this Design Standard, then the proposed deviations should be approved in writing by Principal.

1.2 Approved Applicators

Surface preparation and coating application shall be undertaken by an approved Water Corporation Protective Coating and Concrete Repairs Panel Services member, unless approved otherwise by the Principal.

1.3 Quality Assurance

The coatings contractor shall nominate a competent person to prepare Quality Assurance documentation to meet the specified standards given herein and the required acceptance criteria.

1.4 Abrasive Blasting and Coating Applicators - VOC

A Verification of Competency (VOC) is a method of assessment that is used to verify abrasive blasting and coating applicator's ability to operate equipment and/or undertake the responsibilities of their role. Suitable competency verification records shall be maintained by the Contractor.

1.5 Coating Inspector

The Contractor shall nominate a certified coating inspector to perform inspections and maintain appropriate records for the work performed. Coating Inspector, which is engaged in testing, monitoring and verification of surface preparation and coating application shall hold relevant inspection qualifications and current certifications (e.g. NACE/AMPP or ACA) or approved by the Principal. Refer to NACE/AMPP supervision guidelines to define roles and accreditation levels (refer Appendix 4). The Principal shall be consulted to ensure adequate accredited coatings inspectors are assigned to complex and critical risk projects.

Additionally refer to AS2312 clause 9.6.1 'Inspection Requirements'

Note: The intended roles and responsibilities to each level of certification and the CIP program refers to technical oversight and not general supervision of employment.

1.6 Contractor's Responsibilities.

1. Contractor shall perform all inspections as necessary to ensure that all work is performed in accordance with this Specification, relevant statutory requirements or other references as approved by Water Corporation.
 - a. Ensure sufficient checks are carried out to monitor overall coating quality and confirm it meets the specified standards provided in this specification.
 - b. Any non-conforming surface preparation, coating or lining deficiencies shall be recorded and repaired.
2. Water Corporations authorised inspector(s) shall be given adequate notice (minimum 24 hours) prior to the start of surface preparation and coating application and witness or repeat any of these inspection functions as necessary.
 - a. Inspection by Water Corporation does not relieve the Contractor of their responsibilities to ensure compliance to the relevant specified coating system.
 - b. The Contractor shall ensure that the coatings inspector has the requisite levels of accreditation and is qualified for the specific project coating inspection requirement. The coatings inspector may be a third-party inspector, employed directly by the owner or part of the contractor's quality control.

Curriculum Vitae (CVs) for all QC coatings personnel above shall be submitted to Principle for approval.

3. Where the work is performed at the Contractor’s blast/coating facility, the Contractor shall ensure that coated items are loaded for delivery to site in such a manner that ensures minimal damage in transit.
4. Contractor shall provide all the required inspection equipment necessary to maintain compliance to specification and testing requirements.
 - a. All relevant inspection equipment shall have current calibration certificates.
5. Water Corporation reserves the right to conduct audits to contractors at any given time as well as retaining the option to enlist the services of third party to conduct the audit.

1.7 Coating In Contact with Drinking Water

DISCLAIMER NOTICE: All coating products that are listed in DS95 Appendix 3 and proposed new products for use in contact with drinking water must be listed in Department of Health – Materials, products and substances in contact with drinking water – Schedule 5 Approved Materials, and subject to evaluation and written approval by Water Corporation Water Quality Branch complying to ADWG Guidelines prior to use UNTIL FURTHER NOTICE.

Any coating in contact with drinking water shall be certified to comply with AS/NZS 4020 by a NATA accredited laboratory. All coatings applications including those with AS/NZS 4020 certificates or overseas coatings tested and approved with ANSI/NSF 61 or BS 6920 certificates or equivalent shall be submitted to the Water Corporation Drinking Water Quality Branch. This will be referred to the Department of Health for acceptance of the product in the specific application prior to use. Design consultants, asset maintainers and coating contractors shall refer to Schedule 5-List of products approved for use in Drinking Water issued by the Department of Health, Western Australia requested through the Water Corporation.

1.8 Cathodic Protection (CP) System Compatibility

If the structure to be protected has a CP system installed on it, then the coating system nominated shall be suitable for use on CP applications. For more information on CP, reference shall be made to Water Corporation Design Specification DS 91- Cathodic Protection of Steel Structures.

1.9 Referenced Documents

Australian Standards

| | |
|---------------|---|
| AS/NZS 1580 | Paints and related materials— Methods of test |
| AS/NZS 1627.1 | Cleaning using liquid solvents and alkaline solutions |
| AS/NZS 1627.2 | Power tool cleaning |
| AS/NZS 1627.4 | Abrasive blast cleaning |

| | |
|----------------------|--|
| AS/NZS 1627.5 | Pickling, descaling and oxide removal |
| AS/NZS 1627.7 | Hand tool cleaning of metal surfaces |
| AS/NZS 2312.1 | Guide to the protection of structural steel against exterior atmospheric |
| AS/NZS 2312.2 | Corrosion by the use of protective coating -Paint coating. |
| AS/NZS 2700 | Guide to the protection of structural steel against atmospheric corrosion by the use of protective coating- -Hot dip galvanizing |
| AS 3894.1 | Colour standards for general purposes |
| AS 3894.2 | Non-conductive coatings - Continuity testing - High voltage ('brush') method |
| AS 3894.3 | Non-conductive coatings - Continuity testing - Wet sponge method |
| AS 3894.4 | Determination of dry film thickness |
| AS 3894.5 | Assessment of degree of cure |
| AS 3894.6 | Determination of surface profile |
| AS3894.7 | Determination of residual contaminants |
| AS 3894.9 | Determination of surface temperatures |
| AS 3894.10 | Determination of adhesion |
| AS 3894.11 | Inspection report-Daily |
| AS 3894.12 | Equipment report |
| AS3894.13 | Inspection report-Coating |
| AS/NZS 4020 | Inspection and Daily Report |
| AS/NZS 4158 | Testing of products for use in contact with drinking water |
| AS/NZS 4321 | Thermal-bonded polymeric coatings on valves and fittings for water industry purposes |
| AS/NZS 4352 | Fusion-bonded medium-density polyethylene coating and lining for pipes and fittings |
| AS4361.1 | Tests for coating resistance to cathodic disbonding |
| AS/NZS 4680 | Guide to hazardous paint management – Part 1 lead and other hazardous metallic pigments in industrial applications |
| AS3894.13 | Hot dip galvanized (zinc) coatings on fabricated ferrous articles |
| AS/NZS 4020 | Paints and related materials— Methods of test |
| AS/NZS 4158 | Cleaning using liquid solvents and alkaline solutions |

| | |
|--------------------|---------------------------------------|
| AS/NZS 4321 | Power tool cleaning |
| AS/NZS 4352 | Abrasive blast cleaning |
| AS4361.1 | Pickling, descaling and oxide removal |
| AS/NZS 4680 | Hand tool cleaning of metal surfaces |

American Society for Testing and Materials (ASTM) Standards

| | |
|-------------------|---|
| ASTM D 4285 – 83 | Standard Test Method for indicating Oil or Water in Compressed Air |
| ASTM D4263 | Standard Test Method for Indication Moisture in Concrete. |
| ASTM D 4262 | Test Method for PH of Chemically Cleaned or Etched Concrete Surfaces. |
| ASTM D 4541 | Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers |
| ASTM D7234 | Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers |
| ASTM C1583/C1583M | Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method) |

International Organization for Standardization (ISO)

| | |
|-------------------|---|
| ISO 11126 | Preparation of steel substrates before application of paints and related products: Specifications for non-metallic blast-cleaning abrasives - Part 10: Almandite garnet |
| ISO 8501-1 | Preparation of steel substrates before application of paints and related products- Visual assessment of surface cleanliness |
| ISO 8502-3 | Test for Particulate Contamination |
| ISO 8501-3 | Preparation grades of welds, edges and other areas with surface imperfections |

Steel Structures Painting Council (USA) Standards

The following, except for visual (Vis) standards, are published in Steel Structures Painting Manual, Volume 2

| | |
|-----------------|----------------------------|
| SSPC SP1 | Solvent cleaning |
| SSPC SP2 | Hand tool cleaning |
| SSPC SP3 | Power tool cleaning |
| SSPC SP5 | White metal blast cleaning |
| SSPC SP6 | Commercial blast cleaning |
| SSPC SP7 | Brush-off blast cleaning |
| SSPC SP8 | Pickling |

| | |
|--------------------|---|
| SSPC SPI0 | Near-white blast cleaning |
| SSPC SP11 | Power tool cleaning to bare metal |
| SSPC-SP 13 | Surface Preparation for Concrete |
| SSPC- SP 16 | Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and NF Metals |
| SSPC Vis 1 | Reference photographs for steel surfaces prepared by dry abrasive blast cleaning |
| SSPC Vis 3 | Reference photographs for steel surfaces prepared by power and hand tool cleaning |
| SSPC PA2 | Measurement of dry paint thickness with magnetic gauges |

2 Conditions of Steel Surfaces

New or used unpainted steel may be categorized in any one of four general conditions, described and illustrated in pictorial standards SSPC-Vis 1 and ISO 8501-1. The general conditions are Rust Grades A, B, C, and D, as described in the following.

Table 2: General Conditions of Rust Grades

| | |
|---------------------|---|
| Rust Grade A | Steel surface largely covered with mill scale, but little or no rust |
| Rust Grade B | Steel surface covered with both mill scale and rust that has begun to flake off |
| Rust Grade C | Steel surface completely covered with rust; little or no pitting visible |
| Rust Grade D | Steel surfaces completely covered with rust; pitting visible |

3 Surface Preparation Standards

The primary purpose of surface preparation is to produce a surface that is clean and free of any material which may cause premature failure of the coating (e.g. Osmotic Blister). If the surface has contamination such as mill-scale, rust, salt, moisture or oil, then any subsequent coating will not be as adherent to the surface. Mill-scale remaining on the surface can cause Galvanic Corrosion.

Another aspect of surface preparation is to produce an adequate profile to the substrate. This is a measure of the height and depth of the “Hills and Valleys” produced on the surface. The greater the profile, the more surface that is presented to the coating for it to adhere to, so the better the adhesion. The roughness also allows the coating to lock into or key into the surface. However, if the profile is greater than the coating thickness, then peaks will protrude from the surface allowing spot rusting to occur. Profile must be in the correct range for the coating type and its thickness.

The most common way and preferred surface preparation method of producing a suitable profile and to remove rust, mill scale, or other surface contaminants is by abrasive blast cleaning. This is achieved by projecting a highly concentrated stream of relatively small abrasive particles at high velocity against the surface to be cleaned. The abrasives used for blast cleaning shall comply with stringent requirements of ISO11126-10. The surface preparation by substrate is given in Table 3.

All Water Corporation coating surface preparation standards shall comply with White Metal Blast, Sa3 in accordance with AS/NZS 1627.4. The surface profile shall be determined in accordance with AS 3894.5.

Bristle Blasting (MBX) can be considered as an alternative surface preparation method usually for smaller surface areas and maintenance work in situations where grit blasting is impractical or cannot be used.

Visual standards (ISO 8501-1) are used as pictorial examples that can be used to judge and compare blast cleaned standards with work on site.

Table 3: Surface Preparation by Substrate Material Type.

| Substrate Cleaning | Cast Iron or Steel | Galvanized | Aluminium | Plate Metals (e.g. Tin plate) | Stainless Steel | Non-Ferrous | Plastic PVC/FRP | Concrete | Previously Painted Surfaces |
|--|--------------------|------------|-----------|-------------------------------|-----------------|-------------|-----------------|----------|-----------------------------|
| SSPC-SP1 Solvent Clean | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| SSPC-SP2 Hand Tool Cleaning | ✓ | ✓ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✓ |
| SSPC-SP3 Power Tool Cleaning | ✓ | ✓ | ✗ | ✗ | ✗ | ✗ | ✗ | ✓ | ✓ |
| SSPC-SP11 Power Tool Cleaning | ✓ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✓ |
| SSPC-SP7/NACE /AMPP 4 Brush-Off Blast (Whip) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ |
| SSPC-SP6/NACE/AMPP 3 Commercial Blast Cleaning | ✓ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✓ |
| SSPC-SP10/NACE/AMPP 2 Near-White Blast Cleaning | ✓ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✓ |
| SSPC-SP5/NACE /AMPP 1 White Metal Blast Cleaning | ✓ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✓ |
| SSPC-SP12/NACE /AMPP 5 High and Ultra high-Pressure Water Jet | ✓ | ✗ | ✗ | ✓ | ✗ | ✗ | ✓ | ✓ | ✓ |
| SSPC-SP13/NACE/AMPP 6 Surface Prep. of Concrete | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✓ | ✗ |

4 Surface Contamination Analysis Test on the Blast Cleaned Surface

4.1 Surface Contamination Test

Soluble salt testing, of the prepared surface, shall be conducted on all coating systems on assets that will be immersed, buried or on-site structures that will be exposed to corrosivity categories of C4 or higher in accordance with AS 3894.6.

The maximum permitted total concentration of soluble salt(s) on carbon steel and stainless-steel surfaces after abrasive blasting and before coating application are:

- Immersion service - 3µg/cm²
- Ambient service - 5µg/cm²

Structures that are due for recoating in a marine environment (C4 and C5) should additionally be re-tested for chloride contamination prior to recoating.

4.2 Particulate contamination

Abrasive blasted surfaces shall be tested for the presence of particulate contamination before coating application in accordance ISO 8502-3 (pressure-sensitive tape method).

Frequency should be a minimum once per 100 m² or once per shift (whichever occurs first). The dust quantity level shall not exceed rating 2 and class 2 for dust particle size. Alternatively, surfaces to be coated shall be tested for the presence of particulate and spent abrasive in accordance with AS 3894.6 – Method C, Determination of Surface Dust.

The dust quantity level shall not exceed rating 2 by visual reference standard. Non-conforming of particulate contamination quantity shall be cause for further cleaning. In the event that particulate contamination of production abrasive blasted surfaces persists, the surface shall be blown down with clean air until a conforming rating has been achieved.

| | |
|--|----------|
| | 1 |
| | 2 |
| | 3 |
| | 4 |
| | 5 |

Figure 1: Pictorial references corresponding to dust quantity ratings 1, 2, 3, 4 & 5 (Extracted from ISO 8502-3)

Table 4 Dust size classes (Extracted from ISO 8502-3)

| Class | Description of dust particles |
|-------|--|
| 0 | Particles not visible under x10 magnification |
| 1 | Particles visible under x 10 magnification, but not with normal or corrected vision (usually particles less than 50µm in diameter) |
| 2 | Particles just visible with normal or corrected vision (usually particles between 50µm and 100 µm in diameter) |
| 3 | Particles clearly visible with normal or corrected vision (particles up to 0.5 mm in diameter) |
| 4 | Particles between 0.5 mm and 2.5 mm in diameter |
| 5 | Particles larger than 2.5 mm in diameter |

4.2.1 Moisture

Visual assessment is employed to determine the presence of moisture. Also, pressing clean absorbent paper on the surface and visually examining may show the presence of moisture.

4.2.2 Oil and Grease

Oil and grease are difficult to detect visually. Under normal backlighting, oil and grease will appear as translucent spots. Oil may fluoresce when viewed under UV light. AS 3894.6 describes the method to determine the extent of oil and grease on the blast cleaned surfaces.

4.2.3 Mill Scale

Mill scale is normally visible to the naked eye and extra tests are not usually required. On completely clean surfaces (Class 3 blast) residual mill scale is revealed as black patches if the surface is swabbed with a pad containing slightly acidified 4% copper sulphate solution. The surface must be washed with potable grade water and re-blasted after carrying out this test. This test is described in AS 3894.6.

4.2.4 Moisture content of concrete surfaces

Moisture content testing of any concrete surface which requires the application of a protective coating surface shall also be undertaken utilising moisture meter with a sufficient range. The maximum moisture content shall be less than 5% before the application of the protective coating system.

4.3 Surface Preparation Specification

For any protective coating scheme, suitable surface preparation is important. The surface preparation is to remove oil, grease, old coatings, and surface contaminants (such as mill scale and rust on steel, laitance on concrete and zinc salts on galvanised surfaces).

4.3.1 Steel or Cast-Iron

Surface preparation of Steel or Cast-Iron substrates shall be carried out to Class 3 cleanliness using either steel shot/grit or new garnet. Australian Manufactured Garnets with maximum allowable total chlorides of 10-15 ppm (max 25 ppm) shall be used.

The blast abrasive shall clean deep into the cavities and pitted areas down to bare metal, thoroughly removing all rust, soluble salts and other contaminants. The abrasive used shall achieve a surface profile in accordance with the requirements of the relevant coating to be applied, and garnet shall not be re-used. The abrasive batch certificates must be made available for review by the Water Corporation or its representative.

4.3.2 Concrete

Concrete, prior to the application of protective coatings shall undergo moisture content testing. Moisture meters must be used to give quantitative assessments of the moisture content.

Concrete surfaces shall be free of contamination from mould releases; form oils; curing compounds; and other greases, oils, and debris before application of protective coatings.

Concrete shall be cured for a minimum 28 days old or can be longer as required and approved by the Principal, with a moisture content at the time of protective coating application below 5% and the maximum value specified by the product manufacturer for the coating system used. Before protective coating application, all concrete shall be suitable prepared before application of protective coatings ensuring all laitance is fully removed and any holes or voids be patched. Concrete surfaces shall also be free of any curing compounds before the application of the protective coating system.

List of Water Corporation surface preparation specifications are given in Table 5 and detailed surface preparation specifications are available under the design Standards on the Water Corporation website.

Table 5: List of Water Corporation Surface Preparation

| System Designation | Surface Preparation Specification |
|--------------------|--|
| A1 | Surface Preparation for the Application of Protective Coating on Steel or Cast Iron |
| A2 | Surface Preparation for the Application of Aesthetic Coating on Stainless Steel |
| A3 | Surface Preparation for the Application of Protective Coating on Galvanised Steel |
| A4 | Surface Preparation for the Application of Protective Coating on Aluminium |
| A5 | Surface Preparation for the Application of Protective Coating on Concrete |
| A6 | Surface Preparation for the Application of Protective Coating on Plastics |
| A7 | Surface Preparation for the Application of Protective Coating on Fusion Bonded Polyethylene (Sintakote®) |

4.4 Safety Considerations during Abrasive Blasting

Prior to undertaking blast cleaning of coatings on existing assets, especially where the age of the coating is estimated to be over 30 years, notwithstanding the coating age it is solely the contractor’s responsibility to have the coating tested for the presence of lead. Initially the coating shall be tested by removing a layer of the coating down to the substrate and testing the area using a lead paint test kit (available from hardware stores). If the test is positive to the presence of lead then appropriate controls shall be put in place as per the requirements of AS4361 – Guide to hazardous paint management.

5 Coating Inspection

Coating inspection gauges shall be calibrated in accordance to the manufacturer's recommended practices and interval. Calibration certificates shall be witnessed by the Water Corporation representative prior to the start of the inspection.

All the inspection and test equipment used for execution of the works under contract must be available on the job site, be suitably calibrated and be available for use by the Water Corporation representative at time of inspection at no additional cost to the Water Corporation.

Proper and effective control of the environment and conditions during the curing stage of all coating layers are to be maintained. Ideal air temperature for painting is between 15°C and 30°C. It is important to note that final surface preparation and/or coating application shall not take place when any one of the following conditions exist:

1. The relative humidity is above 85%;
2. The substrate temperature is less than 3°C above the dewpoint;
3. The substrate temperature is below 10°C;
4. The substrate temperature is above 55°C;
5. The surface to be coated is wet or damp;
6. The full prime coat application cannot be carried out before the specified cleanliness of the surface deteriorates;
7. The weather is deteriorating or is unfavourable for application or curing; or
8. The pot life of the paint has been exceeded.

5.1 Surface Profile of the Blast Cleaned Surface

Surface profile is the determination of the roughness of the surface and for painting purposes involves depth of the profile, peak density and angularity of the profile.

To determine the profile height or anchor pattern of an abrasive blast cleaned surface, one of the more commonly used methods is the Replica Tape method (TESTEX PRESS-O-FILM) as described in AS 3894.5 (Figure 2).

Surface profile ranges for the specified coating shall be achieved to comply with manufacturer's recommendations.

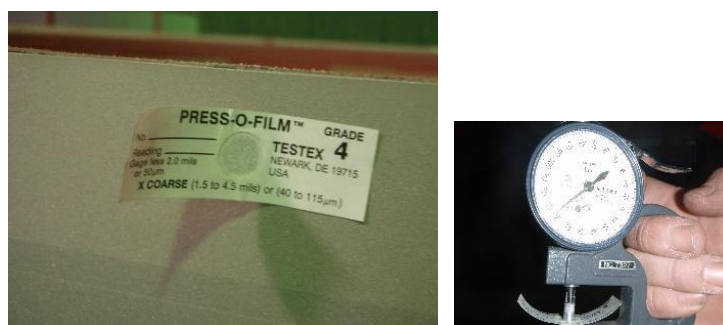


Figure 2: Blast Cleaned Surface Profile Measurement using TESTEX Tape

6 Coating application

1. Coating materials used for attaining the specified standard shall be selected in accordance with Appendix 3 - commonly used coatings in potable water and wastewater infrastructures unless approved otherwise by the Principal. This approval is required before coating commences.
2. Coating specifications and Inspection Test Plans (ITPs) submitted by the **coatings applicator** shall be reviewed and approved by the Principal prior to the application.
3. The Contractor shall submit their Inspection and Test Plan (ITP) documents as proposed for each coating system at least 10 working days prior to commencing work.
Generic ITP examples with the minimum requirements can be found in Water Corporation Durability website (refer link below)
<https://www.watercorporation.com.au/About-us/Suppliers-and-contractors/Resources/Inspections-and-tests>
4. Prior to the application of coating, oil or dirt shall be removed prior to any blast cleaning operations and surfaces not required to be coated shall be protected with masking materials. After the completion of the coating operation, masking shall be completely removed by the Contractor.
5. Coating shall not be applied to any prepared surface(s) exhibiting “flash corrosion” or that has been abrasive blasted more than 4 hours ago. Mixing, thinning, application and curing of protective coating materials shall be in accordance with the protective coating manufacturer's recommended practice for the on-site conditions. Applied coatings shall be protected from rain or moisture until cured.
6. Any inaccessible surface shall be brought to the attention of Water Corporation Principal.
7. The coating components shall be thoroughly mixed in the specified proportions. Material so prepared shall be used within the “pot-life” period claimed by the manufacturer.
8. The finished coating shall be of uniform thickness, colour, appearance and gloss. It shall be fully cured, insoluble, adherent, and free from mud cracking, inclusions of foreign contaminates, amine blush/bloom, pinholes, holidays, laps, sags, blistering, checking, wrinkling, overspray, patchiness and any other defects that may impair the performance and/or appearance of the coating.
9. During site painting operations, every reasonable precaution shall be taken to eliminate the likelihood of paint over-spray drifting outside the area of work if there is a possibility that over-spray could cause damage to property of the Water Corporation, other *Contractors* or to private property. In particular, no spray application of paint coatings shall proceed if the wind speed and direction will carry over-spray outside the site boundary fence or into designated car parking areas on or around the site.
10. Encapsulation of work area shall be considered to mitigate overspray fallout. In windy conditions where over-spray damage could occur and encapsulation is not a viable option, coatings shall be applied by some other means such as by roller, subject to the approval of the Principal.
11. Where a coating system requires more than one product to be used (e.g. Primer and topcoat), all products shall be from the same supplier/manufacturer unless approved otherwise by the Principal.

7 Stripe Coating

To ensure correct total Dry Film Thickness (DFT) of the coating, all welding slag, weld spatter, sharp edges and any other surface irregularities which may impair the appearance or performance of the protective coating shall be removed. Sharp edges shall be radiused to a minimum of 2mm.

1. **Welds, edges, crevices**, seams, joints, bolts and corners shall be brush stripe coated on each coat of a multi coat system before commencement of spray application of the coating. These areas are required to have at least the minimum specified film thickness and to ensure continuity of the coating.
2. The exception is inorganic zinc silicates (IOZS) primer which is exempt from this requirement.

8 TESTS ON APPLIED COATING

8.1 Wet Film Thickness Measurement

A Wet Film Thickness (WFT) gauge is required during paint application to minimise the possibility of low dry film thicknesses.

WFT is usually checked with a notch or comb gauge. The gauge should be used in accordance with AS 3894.3 Appendix C to measure the WFT.

8.2 Dry Film Thickness Measurement

The Dry Film Thickness (DFT) is defined as the thickness of the coating measured, at any location of the coated substrate above the peak of the profile [Refer Figure 3]. The DFT readings should be taken and recorded in accordance with AS 3894.3 and with reference SSPC-PA 2.

Dry film thickness measurements are made using a dry film thickness gauge which has been selected and calibrated in accordance with AS 3894.3 Appendix D.

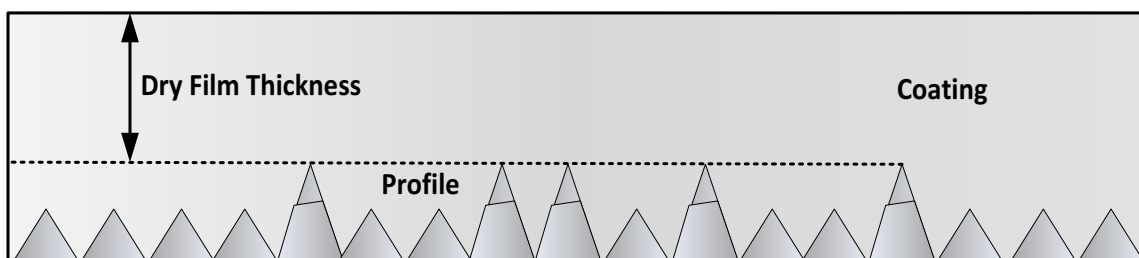


Figure 3: Schematic drawing on the DFT of the coating.

If the measured DFT is less than three times the profile height, a Magnetic Base Reading (MBR) should be subtracted from the DFT reading. To achieve the MBR, the following steps should be applied:

- Zero the DFT gauge on the smooth steel surface (As per AS 3894.3) and;
- Take a number of readings on the blasted surface to obtain an average reading. This average reading is known as the Magnetic Base Reading (MBR). If MBR is not recorded, then the acceptable approximation is one third of the profile height.

Note: For thicker coatings the above procedure is not required.

Table 6: Dry Film Thickness Definitions

| | |
|-----------------------------------|---|
| Dry Film thickness (DFT) | Dry film thickness specified for each coating layer or for the whole coating system |
| Minimum Dry Film thickness | Minimum acceptable dry film thickness for each coating layer or for the whole coating system. |
| Maximum Dry Film thickness | Highest acceptable dry film thickness for each coating layer or for the whole coating system above which the performance of the coating layer or system could be compromised. |
| Gauge “Spot” measurement | A single DFT reading taken at one point. |
| Gauge, “mean” measurement | Arithmetic average of three gauge readings made within a circle of approximately 12 cm diameter. |

8.2.1 DFT - Severe Environments

For surfaces that are to be exposed to severe environments such as immersed, buried or subjected to severe chemical or marine environment, the minimum film thickness specified shall be achieved. This means any area outside specification should be marked for restoration.

8.2.2 DFT - Atmospheric Environment

AS 3894.3 and SSPC PA2 require the average of the five spot readings taken over 10 m2 as described above, to be greater than the specified coating thickness. No single point reading should be less than 80% of the specified thickness.

In all cases the minimum specified thickness stated with this specification is the absolute minimum spot thickness in any area measured. A single point reading below the specified but not below 80% of the specified thickness may be acceptable so long as the spot measurement (average of 3 single point readings within a 12mm diameter) are above the minimum specified thickness, except for protective coatings that are to be either buried or immersed, where no point or spot reading is acceptable below the specified thicknesses.

If three readings were averaged to produce a point reading, an individual reading may be less than 80% of the coating thickness.



Figure 4: Measurement of DFT using electronic gauge.

8.2.3 DFT Measurement Frequency

For areas of flat or uniformly curved coated surfaces, five separate point readings, evenly spaced throughout, should be made in each 10 m² area examined. The 10 m² inspection areas should be selected as shown in Table 7:

Table 7: Large and Small Surface Areas and DFT Measurement

| No. | Area of the Structure | DFT Measurement |
|-----|--|--|
| 1 | Less than 30 m ² | Each 10 m ² area |
| 2 | Structures not exceeding 100 m ² | Three 10 m ² areas should be chosen at random |
| 3 | Structures exceeding 100 m ² | First 100 m ² area should be measured in accordance with Option (2), and for each additional 100 m ² area, a 10 m ² area should be chosen at random |
| 5 | For critical or small surface areas | More readings will be required [discretion of the Principal & Contractor] |
| 6 | For flat areas less than 10 m ² | Minimum of 3-point readings for each m ² |
| 7 | Pipework | Based on pipe diameter, 2-, 4- or 6-point readings should be taken every metre of pipe run, evenly round the circumference [Refer Table 8]. |
| 8 | Beams and angles | One reading should be taken on each flat face less than 300 mm width for each linear metre. |
| 9 | If the total area of pipework, beams or angles exceeds 10 m ² | Five separate point readings, evenly spaced throughout, should be made in each 10 m ² area examined. |

Note:

If the coating thicknesses measurement for any 10 m² area, chosen in accordance with option (2) or (3) does not meet the required specification, then each 10 m² area of surface should be measured.

Table 8: Nominal Pipe Size and DFT Measurement

| Nominal pipe size, mm | Number of Circumferential readings |
|-----------------------|------------------------------------|
| ≤150 | 2 |
| >150≤300 | 4 |
| >300≤600 | 6 |
| ≥600 | 10 |

8.3 Testing and Repairs for Coating Film Continuity

A fully cured coating subjected to immersed, marine, or buried environments shall be tested for film continuity and for defects such as pin holes, misses and damage. There are two methods of continuity testing: (1) Low Voltage & (2) High Voltage.

Defects such as pinholes, cracks, blisters, voids, foreign inclusions, and “rogue” peaks shall be marked for repair and retested when the repair coating is fully cured.

8.4 Low Voltage Continuity Testing

Non-conductive coatings of thickness up to 250 microns should be tested using wet sponge method in accordance with AS 3894.2 – Continuity Testing – Wet Sponge Method.



Figure 5: Low Voltage Test Continuity Test using Wet Sponge method

8.5 High Voltage Continuity Testing (Spark Testing)

Where required, non-conductive coatings of thickness above 150 microns shall be tested in accordance with AS 3894.1 – Continuity Testing High Voltage (Brush) Method or coating manufacturer’s recommendations using a high voltage test unit. In this method voltages up to 20,000 volts or more can be applied. The test voltages are selected in accordance with the following equation:

$$V = \frac{250\sqrt{T}}{F}$$

Where,

V = test voltage applied, in volts

T = specified dry film thickness of cured coating, in micrometres

F = rating of a coating’s generic type and the volume solids content (Refer

Table 9).

Where the actual film thickness exceeds the specified film thickness (T) by 25 %, the test voltage (V) should be recalculated using the actual thickness of that area.

Table 9: Coating film rating (F) from coating type and volume solids content

| Type of Coating | Volume Solids % (V/V) | Rating (F) |
|--|-----------------------|------------|
| Chlorinated rubber, Vinyl | 15 to 39 | 4 |
| Low-build epoxy, Tar epoxy | 40 to 59 | 3 |
| High-build epoxy, Tar epoxy | 60 to 79 | 2 |
| Polyester-vinyl ester, Solventless epoxy | 80 and greater | 1 |

Note 1: For thermal bonded polymeric coatings (thermoplastic and thermosetting coating) continuity testing shall be carried out on buried, marine or immersed coatings in accordance with Table 3.3 from AS4158 below.

Table 10: Extracted from AS 4158 (Table 3.3)

| Region | End result | Repair limitations | Test requirements |
|-------------------------|-------------------|---|--|
| Internal wetted surface | No holidays | Maximum holiday area 25 mm ² per holiday, with a maximum of 3 repairs per coated product or 3 repairs per 100 000 mm ² of coated surface which ever is the greater. | AS 3894.1 at 5V per micrometre of the specified minimum thickness of the coating system. |
| External surface | No visual defects | Maximum holiday area 1000 mm ² per holiday, with a maximum of 6 repairs per coated product or 6 repairs per 100 000 mm ² of coated surface which ever is the greater. | Visual |

Note 2: High Voltage Spark Tester accuracy must be verified using a calibrated Crest meter prior to use for detecting pin holes in the coatings.



Figure 6: High Voltage Spark Tester calibrated using a Crest meter.



Figure 7: Pin holes detected during the spark testing

8.6 Degree of Curing of the Coating

Test methods for the determination of the degree of cure of coatings are given in AS 3894.4 and AS/NZS 1580. The most commonly used test for curing of the coating within the Water Corporation is the Solvent Rub test [AS 3894.4 Method C].

8.7 Adhesion Test of the Coating

On immersed, buried or where nominated by Water Corporation, the adhesion strength of the coating shall be carried out in accordance with AS 3894.9 and AS/NZS 1580. Various methods are associated with this standard and can be referenced in Table 11. The most commonly used and preferred adhesion test in the Water Corporation is the Pull-off (dolly) test [AS/NZS 1580 Method 408.5].

Table 11: Methods of Adhesion Test

| Methods of Adhesion Test | Australian Standard | Coating Thickness (microns) |
|--------------------------|-----------------------------------|-----------------------------|
| Parallel cut method | AS/NZS 1580 Method 408.2 Method A | > 100 microns |
| Intersecting cut method | AS 3894.9 Method A | Any thickness |
| Cross-cut test | AS 3894.9 Method B | Up to 125 microns |
| Pull-off (dolly) | AS 3894.9 Method C | Any thickness |

A test reference panel coated at the same time as the item can be used for the means of conducting adhesion testing, provided that the test reference panel surface preparation and coating application (with the same batches of coating material and abrasives etc.) are used to prevent any repairs after testing on the recently completed coating system.

If the test reference panel is not prepared and coated at the same time as the work piece(s), or if the coating adhesion is either questionable or in any dispute, the Water Corporation reserve the right to request that adhesion testing be completed on the work piece and subsequent repairs be conducted at no additional cost to the Water Corporation.

9 Adhesion Test of the Coating – Pull-off (Dolly)

Pull-off adhesion testing is used to measure the force required to pull a specified diameter of coating away from its substrate. This measured pull-off force provides a direct indication of the strength of adhesion between the coating and the substrate.

Adhesion testing is only required on the following assets: Tanks, & Pressure Vessels or as otherwise specified.

The test location and number of test points shall be agreed upon by the Contractor and the Principal prior to the start of attaching the dollies to the substrate or if applicable on the test reference panel.

The report shall include test results, general failure modes categorised substrate failure, adhesion failure, cohesion failure and glue failure. Water Corporation preferred mode of failure for coatings on concrete is “substrate failure” and “cohesive failure” for steel.

Minimum acceptable adhesion value of Epoxy coating or elastomeric polyurethane on Concrete and Steel shall be 3 MPa and 5 MPa respectively.

Coatings with unacceptable adhesion test results shall be removed and reinstated at no additional cost to The Water Corporation. The Contractor shall spot repair all areas subject to adhesion testing, if a test reference panel is not used, and retest upon full cure of the repair coating.

For further details on the theory and requirements of pull-off testing refer ASTM D 4541, AS1580, AS3894.9, ASTM D7234 and ASTM C1583/C1583M-04 standards.

Note: References shall be made to the pull-off test requirements of individual coating specifications.

10 Records and Inspection Report

The contractor shall keep detailed records and reports covering all environmental conditions and on-site tests carried out on painted work, as required by the applicable specification. To supplement these records, prior to any works commencing, an Inspection Test Plan (ITP) shall be forwarded to the Water Corporation for review a minimum of **ten** working days prior to the commencement of work.

The contractor inspector’s responsibility is to audit the coating inspection documents for conformance to relevant Australian Standards. The following items should be included, but not limited to, in the standard report:

10.1 Ambient Conditions

The report shall include details of prevailing weather conditions, including surface temperature, relative humidity, dew point and general weather observations etc., during the application process, in accordance with AS 3894.10. Ambient conditions shall be recorded at least 4 times per shift at minimum and more frequently when the ambient conditions become close to being unfavourable to conduct surface treatment or coating application.

10.2 Equipment Report

The report shall include details of all production and test equipment used during application and inspection in accordance with AS 3894.11.

10.3 Coating Inspection Report


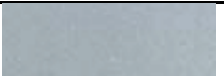





The report shall include details of all coatings applied, the results of quality control testing for all paints, coatings and their component parts including solvents and thinners, for each stage of the work in accordance with AS 3894.12.

11 Protective coating colour

Protective coatings colour shall comply with AS/NZS 2700 - Colour Standards for General Purposes. All work shall comply with AS/NZS 2700 colour code as shown in Table 12. Equivalent German colour code (also known as RAL colour space system) is also included in Table 12. It should be noted that colours will be displayed differently depending upon the computer and screen settings. Therefore, they should be treated as a guide only.

If a suitable approved colour is not available, then the proposed colour shall be referred to the Water Corporation for acceptance prior to use. Also, references shall be made to Water Corporation colour code drawing **No. EG71-1-1, REV E** for details **for treatment plants**.

Table 12: Pipeline Colour Code Identification

| Pipeline Identification | AS/NZS 2700 Colour | RAL Colour Space System* | Colour Reference |
|--|--------------------|--------------------------|---|
| Potable Water (plant) | G21 Jade | RAL 6032 |  |
| Water (Country sites) | N43 Pipeline Grey | RAL 7001 |  |
| Handrails if "safety yellow" specified | Y14 Golden Yellow | RAL 7032 |  |
| Chemicals | P23 Lilac | RAL 310 50 15 |  |
| Fire Services | R13 Signal Red | RAL 3001 |  |
| Air | B25 Aqua | RAL 220 60 20 |  |
| Non-Potable Water | N61 Black | RAL 9011 |  |

* RAL is a colour matching system used in Europe.

12 WATER CORPORATION COATING SPECIFICATIONS

12.1 DS 95 Compliance

Design Standard DS 95 is aligned with AS/NZS 2312 for both Atmospheric and Non-Atmospheric type coatings. Atmospheric environments are classified into corrosivity categories (Very Low - A to Inland Tropical - F) based on the corrosion rates of mild steel given in International Standard Organisation (ISO) 9223. Non-atmospheric environments fall into the category of potable water immersion, sewerage immersion, soil etc.

The alignment of DS 95 to AS/NZS 2312 will assist corrosion engineers, design consultants and coating inspectors to understand and select the correct specification for the various Water Corporation applications. To further assist asset designers and maintenance planners a library of surface preparation and coating specifications have been developed for typical Water Corporation applications and are included in **Appendix 2 and 3**. It is the intention of the Asset Durability team to expand on this list of specifications based on future requirements.

12.2 Choosing the Right Specification

In order to choose the right specification for various Water Corporation assets, atmospheric and non-atmospheric conditions are sub-divided into immersed or non-immersed microenvironments. In simple terms, coating systems consisting of metallic zinc or compounds of zinc are used only for non-immersed environments with or without top colour coat.

On the other hand, coating systems such as high build epoxies and elastomeric urethanes, where no zinc is present are applied for immersed environments without topcoats. There are exceptions where a coating system can be used in both the immersed and non-immersed environments e.g. Epoxy Mastic.

Careful consideration shall be given to some coating systems where the specified nominal dry film thickness is greater than the AS/NZS 2312 or equivalent to the ISO 9223 standard.

Also, when selecting a coating system suitable for the environmental classification, the coating system shall have a minimum design life to first minor maintenance of 10 years, which is categorised as no more than 1% of the total surface area having corrosion of the parent metal.

Atmospheric corrosivity categories per the requirements of AS/NZS 2312, may not include coatings which are to be immersed, buried or in any macro/microenvironment which may differ from atmospheric corrosion conditions such as the internal of tanks etc.

The atmospheric categories for coating system selection shall be as follows;

- C1 – Very Low. Environments in this category are mostly found inside heated or air-conditioned buildings with clean atmospheres.
- C2 – Low. Environments in this category include dry rural areas as well as other regions remote from the coast or sources of pollution.
- C3 – Medium. This category mainly covers coastal areas with low salinity.

- C4 – High. This category occurs mainly on the coast.
- C5 – Very High (Industrial and Marine). This category is common offshore and on the beachfront in regions of rough seas and surf beaches.

For any coatings subject to buried, immersion or macro/micro environmental conditions, the Principal shall be contacted for any special requirements regarding protective coating system selection.

12.3 Coating Thickness Deviation

It is the responsibility of the design consultant to ensure that the specified thickness in the specification will not impede the tolerances and clearances of various mechanical components. The design consultant should discuss the coating requirement thickness with the Principal.

The Water Corporation recommends use of the following coating types on potable/wastewater infrastructures:

12.4 Group B - Inorganic Zinc Silicate

Inorganic Zinc Silicate also known as IZS consists of finely divided metallic zinc dispersed in a self-curing inorganic alkyl (ethyl) silicate medium. IZS coatings react with steel to form a chemical bond.

The zinc dust metal provides galvanic corrosion protection to the mild steel substrate. If the IZS coating is damaged, the zinc silicate film repairs itself and protects steel substrate by sacrificial cathodic protection. IZS coating are mainly used for non-immersed environments.

Too thick a coating of IZS, will result in “Mud Cracking”.

12.5 Group C - Zinc Rich Epoxy Primer

Zinc Rich Epoxy primer is an organic coating and depends on physical rather than chemical bonding to steel. It contains zinc in powdered metallic form dispersed in organic base (Epoxy) and curing agent (Polyamide).

Zinc rich epoxy is easier than IZS to apply without mud cracking. Topcoat is easier to apply and cures at a faster rate compared to IZS. The advantage of zinc rich epoxy is that it is more surface tolerant compared to IZS. Zinc Rich Epoxy primers are mainly used for non-immersed environments.

12.6 Group D – High Build Epoxy

Epoxies consists of an epoxy base with an amine adduct or polyamide curing agent as the resin binder. The colour range is limited, usually flat or low gloss. May be used as finish coat but their main disadvantage is they chalk and discolour with UV radiation, but this has little detrimental effect on performance. This can be overcome by applying a polyurethane or acrylic epoxy topcoat to give a glossy finish for extra protection.

Epoxies are hard, tough coatings with good chemical and solvent resistance. In situations, where more than 1000 microns thickness of coating is required then Ultra High Build Epoxy is preferred. High Build Epoxies are mainly used for potable water and wastewater immersed environments.

12.7 Group E – Epoxy Mastic

Consists of an epoxy resin base with an adduct or polyamide curing agent with evaporative hydrocarbon and alcohol, or ketone or glycol ether solvent (or combinations of each). Hand or power tool cleaned steel

substrate can be coated with Epoxy Mastic and hence referred to as ‘surface tolerant epoxy’. Epoxy Mastic coatings can be brushed or rolled.

Epoxy Mastics are mainly used as maintenance coatings and can be used for both immersed and non-immersed potable water and wastewater environments.

12.8 Group F – Mineral Filler Epoxy

Mineral flake coatings contain microns thick mineral flakes which make the coating much tougher than ordinary industrial paint. Glass flake particles form dense, inert barriers within the paint film. Overlapping layers of glass resist water and chemicals permeating into the paint film. The addition of glass also increases the flexibility, hardness and abrasion resistance of coatings.

Glass flake coatings can be used for both immersed and non-immersed potable water and wastewater environments.

12.9 Group G - Fusion Bonded Epoxy Powder

FBE powder coating is applied on the surface by pre-heating the substrate. The epoxy resin forms cross-linking reaction which is irreversible i.e. after the curing, the coating cannot be returned to its original form by any means.

The coating can be used for pipelines buried in soil, immersed and non-immersed environments in both potable water and wastewater assets.

12.10 Group H – Galvanising

Galvanising is the process of applying a protective zinc coating to steel or iron, to prevent rusting. The zinc coating protects the substrate by the Galvanic method and is mainly used for non-immersed environments.

12.11 Group I – Elastomeric Polyurethanes (Polyurea etc.)

Polyurea is a type of elastomer that is derived from the reaction product of an isocyanate component and a synthetic resin blend.

Polyurethane and polyurea elastomeric membranes are exceptionally tough and flexible to compensate for the movement and cracking of substrates – particularly concrete. They are mainly used for potable water and wastewater immersed environments.

12.12 Group J – Anti-graffiti Coating

Anti-graffiti coatings try to prevent the permanent adherence of graffiti on painted surfaces, where once the surface has been tagged maintenance personal can remove the unwanted graffiti without damaging the original protective coatings. The anti-graffiti coating should be resistant to the solvents typically used for the removal of the graffiti without permanent damage of the anti-graffiti coating system.

12.13 Group K – Water Based Acrylic Coating

Water based coatings can be applied to damp surfaces and are used for decorative purposes. Also used to maximise resistance to weathering and hence retain colour well with time. These paints also emit low amounts of Volatile Organic Compounds (VOCs), which is good for the environment. The disadvantage is

if there is excessive moisture on the material being coated, then the adhesion of the paint is reduced resulting in failure of paint due to blistering.

12.14 Group L – Tape Wrapping and Heat Shrink Sleeve

Tape wrapping is a form of corrosion protection for pipelines, valves, gear boxes etc. It is fast and relatively simple to apply by hand.

Heat Shrink Sleeves are heat shrinkable polyethylene sleeves which provide extremely tough anti-corrosion protection for welded pipeline joints and factory coating repairs. They are compatible with all commonly used pipe coatings and are suitable for operation from -20°C up to 80°C.

12.15 Group M – Miscellaneous Coating

The above type of coating systems are applied to pipework, pipelines and other assets that encounter concrete and other types of assets. **Appendix 2** shows the Water Corporation coating specifications that are suitable for various potable and wastewater assets.

13 COATING SYSTEMS FOR NEW WATER CORPORATION ASSETS

Table 13 and Table 14, provide appropriate coating systems for the common structures found in Water Corporation, water and wastewater treatment facilities. The tables also contain the assets common materials of construct and their typical exposure condition. Some assets may not have been listed or may be known by some other name.

If a substrate is left uncoated or a coating is intended for protection against specific chemicals, ensure that the material has an adequate corrosion resistance for the specific environment.

Pipes, valves, fittings that have factory-applied fusion bonded external/internal coating or suitable cement lining typically do not require additional coatings.

Any coating in contact with drinking water shall be certified to comply with AS/NZS 4020 by a NATA accredited laboratory. Design consultants, asset maintainers and coating contractors shall refer to Schedule 5 – List of products approved for use in Drinking Water issued by the Department of Health, Western Australia requested through the Water Corporation.

DISCLAIMER NOTICE: All coating products that are listed in DS95 Appendix 3 and proposed new products for use in contact with drinking water must be listed in Department of Health – Materials, products and substances in contact with drinking water – Schedule 5 Approved Materials, and subject to evaluation and written approval by Water Corporation Water Quality Branch complying to ADWG Guidelines prior to use UNTIL FURTHER NOTICE.

If there is any doubt in the selection of coatings, then the matter should be referred to the Principal.

Refer **Appendix 3** for commonly used coatings in potable water and wastewater infrastructures.

Table 13: Examples of typical coatings for assets associated with potable water

| | Item | Substrate | Surface Prep. Specification | Coating Specification | Micro Environment | Environment Classification | Comments |
|----|-------------------------------|--|------------------------------------|------------------------------|----------------------------|-----------------------------------|---|
| 1 | Handrails | Galvanised Steel | | H2 | Above Ground | C1 – C3 | If colour coat is required refer item2 |
| 2 | Handrails | Galvanised Steel | A3 | E4 | Above Ground | C4 – C5 | |
| 3 | Handrails | Aluminium | | | Above Ground | N/A | No Coating Required |
| 4 | Pipes | Carbon Steel | A1 | C2 | Above Ground | C1 – C5 | If top colour coat is required for aesthetic purposes |
| 5 | Pipes | Fusion Bonded Polyethylene (Sintakote) | A7 | E5 | Above Ground | C1 – C5 | If top colour coat is required for aesthetic purposes on Sintakote pipe/fittings |
| 6 | Pipes | Fusion Bonded Polyethylene (Sintakote) | | | Below Ground | N/A | No Coating Required. Bare steel sections to be wrap in accordance with L1 or L2.1 |
| 7 | Pipework | PVC | A6 | K1 | Above Ground | C1 – C5 | To protect against UV rays |
| 8 | Building Structural Steel | Carbon steel | | H2 | Above Ground/ Non-Immersed | C1 – C | Contact Durability team for alternative options |
| 9 | Steel Tank internal/clarifier | Carbon steel | A1 | D1, F1 | Immersed | | |
| 10 | Steel Tank external | Carbon steel | A1 | C2 | Above Ground/Non-Immersed | C1 – C5 | |

Table 14: Examples of typical coatings for assets associated with Wastewater

| Item | Substrate | Surface Prep. Specification | Coating Specification | Micro Environment | Environment Classification | Comments |
|--------------------------------|------------------|-----------------------------|-----------------------|------------------------------|----------------------------|---|
| Handrails | Galvanised Steel | | H2 | Above Ground or Non-Immersed | C1 – C2 | No Coating Required |
| Handrails | Aluminium | A4 | | Above Ground | C1 – C4 | No Coating Required |
| Pipework | PVC | A6 | K1 | Above Ground | C1 – C5 | To protect against UV rays |
| Steel Tank internal | Carbon steel | A1 | D1 | Immersed | N/A | |
| Steel Tank external | Carbon steel | A1 | C2 | Above Ground/Non-Immersed | C1 – C5 | |
| Concrete Tank with odour cover | Concrete | A5 | D3 | Immersed/Non-Immersed | AS 3735 Class B2-D | Coating shall extend down to a level 500 mm below the lowest service water level in the structure |
| Chemical storage bund | Concrete | | CR5 | Non-Immersed | AS 3735 Class B2-D | Refer to Spec.CR5 |

14 PIPELINES COATING – BURIED & ABOVE GROUND PIPE

14.1 Buried Pipework

14.1.1 Buried Pipework (Workshop Manufactured)

Where MSCL pipes with fusion bonded polyethylene coating (Sintakote[®]) are used to fabricate pipe fittings the coating shall be stripped back a minimum of 100mm away from the actual weld. On completion of welding the stripped areas in the case of Sintakote pipe or fittings fabricated from rolled plate shall be coated as per the requirements shown in Table 16.

14.1.2 Coating Requirements (Workshop Manufactured)

1. Prior to application of the protective coating system, surfaces shall be prepared such that rust, and any other deleterious material are removed, in accordance with the coating manufacturer's requirements.
2. In relation to heat shrink sleeves and tape wrapping, clean and prepare the surface to be protected. The minimum surface preparation requirements shall be degreasing and mechanical wire brushing to obtain ST2 cleanliness in accordance with AS/NZS1627 Part 2 for heat shrink sleeve and tape wrapping installation. Heat shrink sleeve products as shown in Table 16 are suitable for both workshop and field installations.
3. A Class 3 blast finish is required for the application of Epoxy spray applied coatings in accordance with AS/NZS1627 Parts 4 and 9.
4. Fusion bonded medium density polyethylene coatings shall be applied in accordance with AS/NZS 4321 by Steelmains and or licences applicators only. Contractors seeking to use other applicators shall seek approval from the Principal before surface treatment is commenced.
5. Epoxy coatings shall be applied to fittings and large assemblies as shown in Table 16. The coating shall be applied as per the *Corporation's* surface preparation specification "A1" and the paint manufacturer's recommendation.
6. The epoxy coating thickness shall be 2000 microns DFT minimum as per of Water Corporation Specification D4 Epoxy coating shall overlap Sintakote coatings on pipe sections by 100 mm. Epoxy coatings shall be selected in accordance with Appendix 3 - commonly used coatings in potable water and wastewater infrastructures unless approved otherwise by the Principal and shall not be susceptible to cathodic dis-bonding.
7. Coating data sheets shall be provided to the Principal for coating acceptance and approval, a minimum of 2 weeks prior to the commencement of work. Coating data sheets shall verify that the proposed epoxy coatings have been tested in accordance with AS/NZS 4352 – Testing for coating resistance to cathodic dis-bonding.

8. Coatings shall be spray applied. Epoxy coated fittings shall be thoroughly inspected prior to installation on-site to identify transportation and construction damage to the coating. All site coating repairs shall be undertaken by an approved applicator and spark tested to the test parameters noted in Table 15.
9. Tape wrapping shall be carried out as per the Corporation's specification 'L1' as applicable. The wrapping shall overlap the polyethylene coating (Sintakote) by a minimum of 100 mm.
10. During fabrication, the internal cement mortar lining shall be stripped back to a minimum of 50 mm away on either side of the actual weld to prevent damage to the existing lining. On completion of welding the internal cement lining shall be reinstated in accordance with the Water Corporation's specification M8.
11. Temporary lifting lugs shop welded to assist with manufacture and transportation of pipe fittings shall be removed and dressed back prior to field coating/wrapping.
12. Fittings that are not covered in Table 16 schedule and cannot be epoxy coated or heat shrink sleeve wrapped shall be Petrolatum tape wrapped as per Option 4.
13. All coatings, wrappings and shrink sleeves shall be spark tested by the Contractor and verify by the Principal using high voltage brush methods to AS 3894.1 prior to backfilling. Spark testing equipment shall be within 2 years of calibration or manufacture recommendations. Spark testing Voltage parameters shall be as per Table 15. Error! Reference source not found.

14.1.3 Buried Pipework (Field Applied)

1. Prior to application of the protective coating system, surfaces shall be prepared such that rust, and any other deleterious material are removed in accordance with the coating manufacturer's requirements. Refer Table 16 for requirements of typical coating applications.
2. In all circumstances, clean and prepare the surface to be protected. The minimum surface preparation requirements shall be degreasing and mechanical wire brushing to obtain a St2 cleanliness in accordance with AS/NZS 1627 Part 2.
3. Coating for straight section -surfaces at field welded butt joints, SSJ, RRJ, RRJ-WR, flat and convex banded connections (Per AY58-19-1) shall be in accordance with Water Corporation Specification L2.1 or tape wrapping as per Table 16. Application of heat shrink sleeves shall be in accordance to the Corporation's specification L2.1.
4. Heat shrink sleeves shall only be installed by accredited and trained applicators. *Contractors* seeking to use other suppliers of heat shrink sleeves shall seek approval from the *Principal*. Heat shrink sleeves shall be applied in accordance with *Corporation's* Technical Specification L2.1 Heat Shrink Sleeve Requirements.

5. Joints in ‘Uneven’ surfaces that will result in voids under the protective coating such as bends, tees, flanges, flange bolts and valve body assembly bolts shall be tape wrapped. The area with abrupt profile changes shall be filled with a mouldable mastic to obtain a smooth even profile.
6. Where pipe transitions from below ground to above ground exist, tape wrapping shall extend to 100mm above finished ground level. Tape wrapping shall be in accordance to the Corporation’s specification L2.1.
7. Damaged Sintakote pipe coatings and or heat shrink sleeves shall be repaired using the Canusa CRP® (Coating Repair Patches), patch repairs shall be made following the manufacturer’s recommended practice. Damaged epoxy coating shall be repaired using the same products and procedures as used in the workshop manufacturing process.
8. Additionally, minor nicks and scratches in the factory applied Sintakote coating can be repaired using extrusion welding. Personnel carrying out the repair shall be trained and competent to PMB01 (Plastic Welding) competency and certificated by a nationally accredited training organisation.
9. All wrappings and shrink sleeves shall be spark tested by the Contractor and witnessed by the Principal using high voltage brush methods to AS 3894.1 prior to backfilling. Spark testing equipment shall be within 2 years of calibration.

Table 15: Spark Testing Parameters

| Coating Process | Test Voltage (Min.) | Tolerance |
|-------------------------------------|---------------------|---------------|
| Medium Density PE Coating | 12 kV | Per AS 3894.1 |
| Heat Shrink Sleeves | 12 kV | Per AS 3894.1 |
| Epoxy Coating (D4) | 8 kV | Per AS 3894.1 |
| Butyl Mastic Tape System (Wrapping) | 12 kV | Per AS 3894.1 |
| Petrolatum 4 Step System | NA | NA |

Table 16: External Coating Buried Pipework –Fabricated Fittings.

| FABRICATED FITTINGS | LOCATION | APPROVED COATING | Alternative coating system (NOT PERMITTED WITHOUT APPROVAL OF THE PRINCIPAL). Refer Note 1 | | |
|---|----------|----------------------------|--|-----------------------------------|-----------------------------|
| | | SINTAKOTE® Refer Note 1 | Heat Shrink Sleeve (L2.1) | Ultra-High Build Epoxy Coating | Tape Wrapping (L1) |
| Manhole | Workshop | Yes | No | No | No |
| | Field | No | No | No | Yes – System B (See Note 2) |
| Segmented Bends | Workshop | Yes | No | No | No |
| | Field | No | No | No | No |
| Flange Connections | Workshop | No | No | No | No |
| | Field | No | No | No | Yes – System B |
| Gibault Pipe End | Workshop | No | No | Yes – M4 | No |
| | Field | No | No | Yes – M4 | No |
| Puddle Flange | Workshop | Yes | No | Yes – D1 | No |
| | Field | No | No | Yes – D1 | No |
| Crotch Plates | Workshop | Yes | No | Yes – D4 | No |
| | Field | No | No | No | No |
| Scours | Workshop | Yes | No | No | No |
| | Field | No | Yes | No | Yes – System B (See Note 2) |
| Air Valve Spigots | Workshop | Yes | No | No | No |
| | Field | No | No | No | Yes – System B (See Note 2) |
| Bypass Spigots | Workshop | Yes | No | No | No |
| | Field | No | Yes (for > DN250) | No | Yes – System B (See Note 2) |
| Hot Tap Spigots | Workshop | No | No | No | No |
| | Field | No | No | No | Yes – System B (See Note 2) |
| Buttweld Fittings Elbows (Note 3) | Workshop | Yes | No | No | No |
| | Field | No | Yes (for > DN250) | No | Yes- System A (for < DN250) |

| FABRICATED FITTINGS | LOCATION | APPROVED COATING | Alternative coating system (NOT PERMITTED WITHOUT APPROVAL OF THE PRINCIPAL). Refer Note 1 | | |
|---|----------|----------------------------|--|--------------------------------|---------------------------|
| | | SINTAKOTE® Refer Note 1 | Heat Shrink Sleeve (L2.1) | Ultra-High Build Epoxy Coating | Tape Wrapping (L1) |
| Buttweld Weld Fittings Reducers | Workshop | Yes | No | No | No |
| | Field | No | Yes (for > DN250) | No | Yes (< DN250). See Note 2 |
| Equal/unequal tee Sections / Y sections | Workshop | Yes | No | No | No |
| | Field | No | No | No | Yes (See Note 2) |
| FB, CWB, SSJ, RRJ-WR (See Note 4) | Workshop | No | No | No | No |
| | Field | No | Yes (for > DN250) | No | Yes (< DN250). See Note 2 |

Notes:

1. **Methods other than Sintakote coating are only permitted when it is technically impractical to apply Sintakote coating, as agreed with the Principal. Scheduling, cost, or reduced lead-time are not considered reasonable justification.**
2. Where full circumferential wrapping using the L1 System B is not possible, L1 System A shall be implemented, for example when pipe is partially buried and crown of pipe is exposed.
3. Any coating not outlined in Table 16 shall be approved by the Principal.
4. Legends

| | |
|--------|----------------------------------|
| FB | Flat Band |
| CWB | Concave Weld Band |
| SSJ | Spherical Slip on Joint |
| RRJ-WR | Rubber Ring Joint Weld Restraint |

14.2 Above Ground Exposed Pipework

Where pipes and fittings are to be installed above ground, they shall be coated with a suitable system to suit the environmental classification and surrounding corrodents, refer to Coating specification M2 (A1, C2).

14.2.1 IZS Primed Pipes

Where bare steel pipes are to be IZS coated they shall be coated in the workshop in accordance with Water Corporation Specifications A1 and B1.

Where inorganic zinc silicate (IZS) is damaged during transit and installation, they shall be reinstated using Water Corporation specification H3.

Where a colour topcoat is specified on the drawings, coating specification A1 and C2 shall be use instead of IZS.

14.2.2 Sintakote Coated Pipes & fittings.

Where Sintakote coated pipe and fittings are specified for above ground application, the Sintakote shall be whip blasted to remove the gloss surfaces and provide a surface profile in accordance with Water Corporation Specification A7. The prepared surfaces shall be coated in accordance with Water Corporation specification M2. For welded joints, the joints shall be coated in accordance with Water Corporation specification M2 (A7, E5).

Finish coating colour shall be in accordance with the AS/NZS 2700 and the Corporation's Drawing EG71-1-1 Rev E.

14.2.3 Miscellaneous Pipework Configuration Coating

For below ground to above ground pipe transitions the coating application shall be in in accordance with Water Corporation coating specification M1. The coating procedure for clean skin pipe when permanently exposed to atmosphere shall be coated in accordance with Water Corporation coating specification M3.

When pipe sections are joined by coupling joints (e.g. Straub®, Gibault®, Viking Johnson®, Klamflex®), then the coating shall be applied in accordance with Water Corporation coating specification M4.

Coating of steel pipes and the Sintakote® pipes at the concrete interface shall be carried out in accordance with Water Corporation specifications M5 and M6 respectively. For the cement mortar relining, references shall be carried out in accordance with Water Corporation specification M8.

Finish coating colour shall be in accordance with the AS/NZS 2700 refer to section 11.

15 VALVES COATING

The purpose behind coating a valve is to extend its service life. All new valves shall be coated in accordance with the relevant Water Corporation Strategic Product Specification (SPS).

Refurbished valves shall be coated as follows:

1. DN 600 and below control valves are coated with High Build Epoxy or Fusion Bonded Epoxy (FBE) in accordance with Water Corporation coating specifications F2 and G2 respectively.
2. Above DN600, control valves are coated with two or more coats of a two pack Epoxy coating system in accordance with Water Corporation coating specification F2.

3. All sizes of non-return valves, coating shall be carried out in accordance with Water Corporation coating specification F2.
4. For hard wearing applications (where abrasion, impact and chemical resistance are required), control valves are coated with high build ceramic filled epoxy coatings in accordance with Water Corporation specification F2.
5. For Butterfly valves including Seal on Disc and Seal on Body, coating shall be applied by the application of two or more coats of High Build Epoxy in accordance with Water Corporation coating specification D2.

16 PUMPS COATING

For the wetted areas of new and existing pumps, coating shall be carried out using High Build Ceramic Filled Epoxy in accordance with Water Corporation coating specification F3. APPENDIX 1 – INSPECTION, TEST AND PLAN.

17 APPENDIX 1 INSPECTION, TESTS AND PLAN (ITP)

Contractor shall submit Inspection and Test Plan (ITP) documentations for each nominated coating system. Please see below link for the minimum requirement of ITP documentations.

The Contractor shall submit their Inspection and Test Plan (ITP) documents as proposed for each coating system at least ***10 working days*** prior to commencing work

Examples of ITP templates for D1, A1 and C2 can be found on the link below:

<https://www.watercorporation.com.au/About-us/Suppliers-and-contractors/Resources/Design-standards>

18 APPENDIX 2 - SURFACE PREPARATION AND PROTECTIVE COATING SPECIFICATIONS

| SYSTEM DESIGNATION | COATING SPECIFICATIONS |
|--|--|
| GROUP – A (SURFACE PREPARATION) | |
| A1 | Surface Preparation for the Application of Protective Coating on Steel or Cast Iron |
| A2 | Surface Preparation for the Application of Aesthetic Coating on Stainless Steel |
| A3 | Surface Preparation for the Application of Protective Coating on Galvanised Steel |
| A4 | Surface Preparation for the Application of Protective Coating on Aluminium |
| A5 | Surface Preparation for the Application of Protective Coating on Concrete |
| A6 | Surface Preparation for the Application of Protective Coating on Plastics |
| A7 | Surface Preparation for the Application of Protective Coating on Fusion Bonded Polyethylene (Sintakote®) |

| SYSTEM DESIGNATION | COATING SPECIFICATIONS |
|--|---|
| GROUP – B (INORGANIC ZINC SILICATE) | |
| B1 | Inorganic Zinc Silicate Coating on Steel or Cast Iron |
| GROUP – C (ZINC RICH EPOXY PRIMER) | |
| C1 | Zinc Rich Epoxy Primer Coating on Steel or Cast Iron |
| C2 | Zinc Rich Epoxy Primer, Epoxy Mastic Coat, Polyurethane Top Coating on Steel or Cast Iron |
| C3 | Zinc Rich Epoxy Primer, Epoxy Mastic Coat on Steel or Cast Iron |
| C4 | Zinc Rich Epoxy Primer, Polyurethane Topcoat on Steel or Cast Iron |
| GROUP – D (HIGH BUILD EPOXY) | |

| SYSTEM DESIGNATION | COATING SPECIFICATIONS |
|---|---|
| D1 | High Build Epoxy Coating on Steel or Cast Iron |
| D2 | High Build Epoxy Coating on Butterfly Valves |
| D3 | High Build Epoxy Coating on New and Old Concrete |
| D4 | Ultra-High Build Epoxy Coating on Steel or Cast Iron |
| GROUP – E (EPOXY MASTIC) | |
| E1 | Epoxy Mastic Coating on Steel or Cast Iron |
| E3 | Epoxy Mastic, Polyurethane Topcoat on Steel or Cast Iron |
| E4 | Epoxy Mastic, Polyurethane Topcoat on Galvanised Steel |
| E5 | Epoxy Mastic, Polyurethane Topcoat on Fusion Bonded Polyethylene (Sintakote) |
| GROUP – F (MINERAL FILLER EPOXY) | |
| F1 | Glass Flake Epoxy Mastic Coating on Steel or Cast Iron |
| F2 | High Build Epoxy Coating on Control Valves |
| F3 | High Build Ceramic Filled Epoxy Coating on Pumps |
| GROUP – G (THERMAL BONDED POWDER) | |
| G1 | Thermostatically Applied Polyester Powder Coating |
| G2 | Thermal Bonded Polymeric Coating on Valves And Fittings for Water Industry Purposes |
| GROUP – H (GALVANISING) | |
| H1 | Repair after Galvanising |
| H2 | Galvanised Coating of Steel Structures |
| H3 | Repair of Inorganic Zinc Silicate (IZS) Coated Structures |
| GROUP – I (ELASTOMERIC POLYURETHANE) | |
| I1 | Elastomeric Polyurethane Protective Coating on Concrete |

| SYSTEM DESIGNATION | COATING SPECIFICATIONS |
|--|---|
| GROUP – J (ANTI-GRAFFITI) | |
| J1 | Anti-Graffiti Coating on New and Old Steel Structures |
| J2 | Anti-Graffiti Coating on New and Old Concrete Structures |
| GROUP - K (WATER BASED ACRYLIC) | |
| K1 | Aesthetic Finish Coating on Above Ground Plastic Pipes and Fittings |
| GROUP L - WRAPPING AND HEAT SHRINK SLEEVE | |
| L1 | Tape Wrapping Procedure |
| L2.1 | Heat Shrink Sleeve |
| L3 | Visco Elastic Tape Wrapping Requirements for Above Ground Application |
| GROUP - M (MISCELLANEOUS) | |
| M1 | Coating Procedure for Pipe Transition Below to Above Ground |
| M2 | Coating Procedures for Above Ground Sintakote® Pipe and Steel Pipe Joints |
| M3 | Coating Procedures for Clean Skin Pipe Permanently Exposed to Atmosphere |
| M4 | Coating Procedure for Coupling Jointed Pipes |
| M5 | Coating Procedures for Above Ground Steel Pipe at New Concrete Interfaces |
| M6 | Coating Procedure for Above and Below Ground Sintakote® Pipe at new Concrete Interfaces |
| M8 | Cement Mortar Lining Repairs in New MSCL Pipes |
| M9 | Grouting Convex Band in Pipelines |

19 APPENDIX 3 - COMMONLY USED COATINGS IN POTABLE WATER AND WASTEWATER INFRASTRUCTURES

DISCLAIMER NOTICE: All coating products that are listed in DS95 Appendix 3 and proposed new products for use in contact with drinking water must be listed in Department of Health – Materials, products and substances in contact with drinking water – Schedule 5 Approved Materials, and subject to evaluation and written approval by Water Corporation Water Quality Branch complying to ADWG Guidelines prior to use UNTIL FURTHER NOTICE.

| Code | Jotun Paints | International Paints | Dulux Paints | Hempel (Wattyl) Australia | PPG |
|------|--|--|---|------------------------------------|--|
| IZS | Resist 86 AU | Interzinc 22 | Durezinc i90 | Galvit ES600/Galvosil 15700 | Ameron D9 |
| ZRE | Barrier Barrier Plus | Interzinc 52e | Zincanode 202 Zincanode 402 | Avantguard 750 | SigmaZinc 109 HS Sigmazinc 68HS |
| EP | Penguard Express ZP Penguard Special | Intergard 345 Interline 982 | Durepon EZP Duremax GPE ZP | Epinamel PR250 | SigmaCover 256 SigmaPrime 200 |
| EM | Jotamastic 90*(valve blue) Jotamastic 90*(off white) | Interseal 670HS Interplus 1180 Interplus 356 (MIO) | Durebild STE Durebild STE (MIO) | Epinamel 985 & 985 MIO | SigmaCover 350 Amerlock 400 Amerlock 400 (MIO) |
| HBE | Tankguard 412* Marathon 550 | Interline 975P** Interzone 954 | Duremax HBE Duremax GPE w Quickturn Duremax GFX | Epinamel TL770SF** Epinamel 985 | Sigmaguard CSF 575 SigmaShield 880 |
| UHB | Jotacote UHB | Interzone 485 | Luxapoxy UHB | Epinamel UHB1000 | Sigmashield 880XS Sigmashield 880 |
| GFE | Marathon Jotamastic 90 GF | Interzone 954GF | Duremax GFX | Hempadur Multi 35560 | Amerlock 400GF |
| EPUR | N/A | Polibrid 705-E** | Flexituff Flexituff DM8 | | N/A |
| PUR | Hardtop AX Hardtop Flexi Hardtop XPL (Matt Finish) | Interthane 990 | Luxathan HPX Weathermax HBR | Poly U400 | SigmaDur 550 |
| AG | | Interfine 878 | Weathermax HBR Acrathane IF | Poly U400 Antigrafitti Clear | PSX700 |
| WBA | N/A | Intercryl 988 | Weathershield Gloss | Solagard | Taubmans All Weather Gloss |
| ZRP | Barrier (2-pack) | Interzinc 52 | Zincanode 202 Zinc Rich 1P | Avantguard 750 | Sigmazinc 109 HS Amercoat 68HS |

CODE

| | | | | | | | |
|------------|--------------------------|------------|------------------------|-----------------|-------------------------------------|------------|------------------------|
| IZS | In-Organic Zinc Silicate | EM | Epoxy Mastic | GV | Galvanised | UHB | Ultra High Build Epoxy |
| ZRE | Zinc Rich Epoxy | GFE | Glass Flake Epoxy | EPUR | Elastomeric Polyurethane | | |
| PUR | Polyurethane | FBP | Fusion Bonded Powder | AG | Anti-Graffiti | | |
| HBE | High Build Epoxy | TBP | Thermal Bonded Polymer | WBA | Water Based Acrylic | | |
| EP | Epoxy Primer | ZRP | Zinc Repair | EM (MIO) | Epoxy Mastic (Micaceous Iron Oxide) | | |

Notes:

- [1] * Complies with AS/NZS 4020- Testing of products for use in contact with drinking water. Contractor to confirm the validity of AS/NZS 4020 certification with coating supplier before ordering.
- [2] ** Complies with AS/NZS 4020- Is 100% Volume Solids for use in potable water utilities e.g., water tanks and surge vessels and clarifiers
- [3] Where a coating system requires more than one product to be used (e.g. Primer and topcoat) both products shall be from the same supplier unless approved otherwise by the Team Leader Asset Durability
- [4] The Water Corporation cannot be held responsible for the claims or performance guarantees offered by coating product suppliers.
- [5] Due to continuous product development, coating contractors shall check with product suppliers to confirm that the product names and numbers are current at the time of ordering.

20 APPENDIX 4 - NACE/AMPP GUIDELINES

NACE AND AMPP Coating Certification Guidelines

| | |
|----------------------------------|---------------------|
| NACE | AMPP |
| Level 1 - Basic Inspector | Basic Inspector |
| Level 2 - Intermediate Inspector | Certified Inspector |
| Level 3 - Advanced Inspector | Senior Inspector |

Coating Inspector Program recommended supervision guidelines

NOTE: For purposes of the Coating Inspector Program, the term "supervision" refers to technical oversight and not general supervision of employment.

To help clarify the intended roles and responsibilities of the different levels of achievement for the Coating Inspector Program, please reference the table below for recommended supervision and role responsibilities for each level of certified professional, along with years of experience on the job. These recommended guidelines should be considered whenever specifying inspection requirements, or when selecting inspectors for specific assignments.

| Project Type & Importance | Basic Inspector (0 to 24 months of inspection experience) | Basic Inspector (Over 24 months of inspection experience) | Certified Inspector (24 – 48 months of inspection experience) | Certified Inspector (Over 48 months of inspection experience) | Senior Certified Inspector |
|--|---|--|---|--|--|
| Simple/Low Risk (Repetitive shop application or field application of coatings to metal products where corrosion or a coating failure is unlikely or of limited concern). | Direct Supervision* | Direct or Indirect Supervision** | Indirect Supervision** | Not required | Not Required |
| Moderate/ Significant Risk (Typical shop or field coating of structural steel subject to moderate corrosive environments) | Direct Supervision* | Direct or Indirect Supervision** | Indirect Supervision** | Indirect Supervision** | Not Required |
| Complex/Critical Risk (Linings, aggressive environments, critical assets with high consequence of failure or exceptionally long-life expectancy. | Not Recommended for Assignment | Direct Supervision* Limited to projects where multiple inspectors are assigned. | Direct Supervision* Should be able to document previous experience /training with work type | Indirect Supervision** Should be able to document previous experience/training with work type | Not Required Should be able to document previous experience/training with work type |
| Supervision Authority | None | None | As required by the owner/agency and/or AMPP guidelines for supervision of Basic coating inspectors. | As required by the owner/agency and/or AMPP guidelines for supervision of Basic coating inspectors | As required by the owner/agency and/or AMPP guidelines for supervision of Basic and Certified coating inspectors |

*Direct Supervision

In-person technical supervision during the assignment, with the allowance for supplemental phone or virtual meeting support as needed. This can be accomplished by an AMPP Certified Coatings Inspector or an AMPP Senior Coatings Inspector. In addition to oversight and verification of inspections performed, supervision responsibility will include a review of all contract documents, inspection reports and photos, inspection equipment (including verification of calibration and usage), and safety equipment to ensure that the inspection work is consistent with contract requirements and the coatings specifications.

**Indirect Supervision

Is defined as contact utilizing remote virtual meetings, phone calls, texts, emails, etc. with limited direct supervision when/if needed and periodic field audits to verify inspection results. This can be accomplished by an AMPP Certified Coatings Inspector or an AMPP Senior Coatings Inspector. Indirect supervision shall provide review and feedback for inspection reports and photos, review of inspection equipment (including verification of calibration and usage), and safety equipment as required by AMPP or the Client. The assigned supervisor is responsible for reviewing and becoming familiar with all contract documents and requirements to ensure that the inspection work is consistent with contract requirements and the coatings specifications.

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