|  |  |
| --- | --- |
| AUSTROADS TECHNICAL SPECIFICATION ATS5343 Coating of Concrete | A close up of a flag  Description automatically generated |

|  |
| --- |
| Contents[1. Scope 2](#_Toc29489159)[2. Definitions 2](#_Toc29489160)[3. Referenced Documents 3](#_Toc29489161)[4. Quality System Requirements 4](#_Toc29489162)[5. Contractor Competency 4](#_Toc29489163)[6. Materials 4](#_Toc29489164)[7. Performance Requirements - General 5](#_Toc29489165)[8. Performance Requirements for Decorative / Anti-Carbonation Coatings 6](#_Toc29489166)[9. Performance Requirements for Moisture / Chloride Resistance Coatings 6](#_Toc29489167)[General 6](#_Toc29489168)[Tidal Zone 7](#_Toc29489169)[Splash Zones 7](#_Toc29489170)[Protective Coatings for Special Applications 7](#_Toc29489171)[Coatings Applied to Retaining Walls 7](#_Toc29489172)[Coatings Applied to Parapet Walls 8](#_Toc29489173)[10. Equipment 8](#_Toc29489174)[11. Time Constraints 8](#_Toc29489175)[12. Trial Application 9](#_Toc29489176)[13. Protection of the Works and Property 9](#_Toc29489177)[14. Surface Preparation 10](#_Toc29489178)[15. Environmental Constraints 11](#_Toc29489179)[16. Application of Coatings 11](#_Toc29489180)[17. Testing 12](#_Toc29489181)[Testing prior to application 12](#_Toc29489182)[Testing after Application 13](#_Toc29489183)[18. Coating Repairs 14](#_Toc29489184)[19. Requirements for Future Maintenance of Coatings 14](#_Toc29489185)[Annexure A: Summary of Hold Points, Witness Points and Records 15](#_Toc29489186) |

# Scope

This Austroads Technical Specification ATS 5343 sets out the requirements for the application of decorative and protective surface coatings to concrete, including supply and quality of materials, surface preparation, application, relevant testing and acceptance criteria.

Requirements for anti-graffiti protection of concrete are specified in ATS 5621.

# Definitions

The following definitions apply to this Specification:

**Adhesion/bond strength:** The attachment forces between a dry film and its concrete substrate.

**Anti-carbonation coating:** Coating applied to concrete and other cement-based substrates to retard their carbonation by atmospheric carbon dioxide.

**Carbonation:** The reaction of atmospheric carbon dioxide with alkaline materials such as concrete, and cement which lowers the alkalinity (pH) and thus protection to steel reinforcement.

**Coat:** A continuous layer of a coating material resulting from a single application.

**Coating:** Either the actual process of covering the concrete surface with a layer(s) of coating material, or a protective or decorative coat of material.

**Coating system:** Either protective or decorative coating system(s).

**Decorative coating system:** Either film-forming coatings, surface treatments or combinations of these which can improve the aesthetic appearance of a concrete surface.

**Dry film thickness (DFT):** The thickness of the applied surface coating(s) after the curing or drying time has elapsed.

**Film-forming coating:** Viscous materials which form a pinhole - free film on the concrete surface to improve its aesthetic appearance or provide protection by acting as a barrier to the ingress of aggressive agents. Coatings are generally applied in two or more layers. Thin coatings have a dry film thickness (DFT) of 100‑300 micron, high build coatings generally exceed 1 mm, whereas cementitious coatings are generally thick applications ranging from 1 to 20 mm thick.

**Primer:** The first coat of a coating system applied to an uncoated concrete substrate designed to enhance adhesion of the coating system onto the surface and/or impart a surface binding and toughening effect on the substrate.

**Pore-lining penetrant** (Hydrophobic Impregnation):
Low viscosity fluids (including silane, silane/siloxane, siloxane, solid silane or silane cream) which react with the available hydroxyl group of the silicate structure of the concrete substrate in the presence of moisture, thus depositing water-repellent silicone resins chemically bonded to the walls of the concrete pore structure. These hydrophobic products can penetrate the concrete by several millimetres and work by repelling water and waterborne chloride ions.

**Protective Coating System:** Either film-forming coatings, surface treatments or combinations of these which can impart protective qualities to the concrete surface against the ingress of aggressive agents.

**Sealer:** Viscous fluids which are intermediate between pore-lining penetrants and film-forming coatings. They can penetrate and block the pores of the concrete substrate and also form a thin film on its surface.

**Surface Treatment:** Viscous materials such as pore-lining penetrants (hydrophobic impregnations) and sealers which can penetrate the concrete or block the pores of the concrete to improve its aesthetic or protective qualities.

**Undercoat:** Highly pigmented coating which can serve as a first coat or intermediate coat before the finish coating to improve the adhesion of a top coat to the substrate.

**Wet film thickness (WFT):** The thickness of the wet coating immediately after application.

#  Referenced Documents

The following documents are referenced in this specification:

**Australian Standards / Handbooks**

AS 1580.108.2 Paints and related materials – Methods of test - Dry film thickness - Paint inspection gauge

AS 1580.408.4 Paints and related materials – Methods of test – Adhesion (crosscut)

AS 1580.408.5 Paints and related materials – Methods of test – Adhesion - Pull-off test

AS 1627.4 Metal finishing - Preparation and pretreatment of surfaces – Abrasive blast cleaning of steel

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

AS 2700 Colour standards for general purposes

AS/NZS 4548.5 Guide to long-life coatings for concrete and masonry Part 5: Guidelines to methods of test

**Austroads**

ATS 5340: Cementitious Patch Repair of Concrete

ATS 5341: Repair of Concrete Cracks

**ASTM International**

ASTM D4262-05 pH of Chemically Cleaned or Etched Concrete Surfaces

ASTM D4263-83 Moisture in Concrete by the Plastic Sheet Method

ASTM D4414-95 Measurement of Wet Film Thickness by Notch Gauges

**British Standards**

BS 1881-Part 5 Initial Surface Absorption Test (ISAT)

# Quality System Requirements

The Contractor must prepare and implement a Quality Plan that includes:

1. details of the proposed coatings, including the manufacturer’s instructions;
2. records of the past performance of the proposed coatings which demonstrate compliance with Clauses 7, 8 and 9;
3. evidence demonstrating the compatibility of the proposed coating system to the nominated substrate, including test certificates;
4. names, experience and qualifications of the coatings application supervisor and key personnel;
5. detailed work method statement (WMS) / procedures for substrate preparation, operation of equipment and application of the coatings; and
6. inspection and test plans (ITPs) that will verify conformance with this Specification.

The WMS / procedures and ITPs must:

1. cross reference all applicable Specification Clauses; and
2. identify all performance requirements and Hold Points.

|  |
| --- |
| **HOLD POINT 1.** |
| Process Held | Commencement of surface preparation and application of coating. |
| Submission Details | The Quality Plan must be provided at least 21 days prior to the commencement of the coating application. |

# Contractor Competency

The Contractor warrants that it (or the subcontractor, if the coating work is being undertaken by a subcontractor) is suitably skilled and experienced in undertaking the application of coatings to concrete.

The coatings application supervisor must be suitably trained and qualified on all aspects of application techniques and must be present at all times during repair work.

Personnel applying the coatings must be suitably trained and skilled in the application of coatings to concrete.

# Materials

Materials must:

1. be brought to site in the original unopened cans which are clearly labelled with the manufacturer’s name, product type, reference and batch numbers;
2. remain in their original, sealed containers until the time of use;
3. be stored in a secure area which is protected from weather and appropriately signed;
4. be free from contamination, gelling, drying out, heavy skin formation and severe segregation of ingredients; and
5. be used before the recommended shelf-life has expired.

The Contractor must provide a certificate from the manufacturer for each batch of coating and primer material confirming:

1. manufacturer’s name and address;
2. product reference;
3. batch number / identification;
4. quantity manufactured in the batch; and
5. date of manufacture.

The Contractor must maintain records showing which elements were treated with each coating batch and provide these records to the Principal prior to completion of the work.

The Contractor must provide a manufacturer’s guarantee confirming that:

1. the coating system and materials comply with the requirements of this Specification; and
2. in outdoor conditions, the coating will not need recoating for at least 10 years after application.

# Performance Requirements - General

The Contractor is responsible for the selection of the coating system and warrants that the coating system will meet the requirements of this Specification.

The surface preparation, storage of materials and application of all coatings must comply with the manufacturer’s instructions / recommendations.

All test certificates required by this Specification must be provided by a laboratory which is accredited under ISO/IEC 17025.

All coats in the system or separate coatings/treatments making up the system must be physically and chemically compatible with each other.

Each coat must have the required colour, gloss and opacity. The final surface must exhibit a uniform colour and texture.

The coating system must be capable of withstanding cleaning with hot water, in the range of 40°C to 50°C, detergent and scrubbing action without loss of adhesion, softening or changing in colour or gloss.

Coating systems applied to highly porous and/or relatively soft concrete substrates must include a high quality pore-filling primer coat or sealer to be applied prior to the application of at least two coats of the protective or decorative part of the overall coating system. The primer and/or the coating system as a whole must also offer surface binding and toughening effect.

Where a primer, undercoat or sealer is required as an integral part of the coating system (i.e. primer coat plus at least two coats of the protective or decorative part of the system), the primer, undercoat or sealer must be a different colour to that of the final nominated colour and must be in accordance with AS 2700.

The coating pigments must be colourfast, not subject to fading or discolouration and exhibit high resistance to chalking and dirt pick up for the duration of the manufacturer’s guarantee.

The applied coating system must satisfy the following requirements:

1. bond strength greater than 0.75 MPa when tested 14 days after application in accordance with AS 1580.408.5;
2. ability to bridge cracks up to 0.3 mm wide;
3. ability to be recoated within 24 hours;
4. have minimum pot life of 1 hour;
5. not to sag or run when applied correctly to vertical surfaces;
6. compatibility to an alkaline surface in accordance with ASTM D 4262‑83:2005.

# Performance Requirements for Decorative / Anti-Carbonation Coatings

Where required, concrete surfaces must be painted with at least two coats of an approved decorative/anti-carbonation coating system and the manufacturer’s specification to achieve a uniform colour and texture. The primer which forms an integral part of the coating system must be applied onto the concrete substrate prior to the application of subsequent coats of the approved decorative/anti‑carbonation coating.

Coatings must satisfy the minimum performance criteria shown in Table 8.2.

Table 8.2: Minimum performance criteria

| Property | Symbol | Requirement | Test Method |
| --- | --- | --- | --- |
| Equivalent Air Layer Thickness | R | >150 m | AS/NZS 4548.5 Appendix D |
| Equivalent Thickness of Concrete | Sc | >450 mm | AS/NZS 4548.5 Appendix D |
| CO2 Diffusion Co-efficient (protective coatings only) | D | <2 x 10-7 cm2/s | AS/NZS 4548.5 Appendix D |
| Water vapour equivalent air layer thickness | Sd | <4 m | AS/NZS 4548.5 Appendix C |
| Dry film thickness (per coat) | DFT | at least 150 μm | AS 1580.108.2 |

# Performance Requirements for Moisture / Chloride Resistance Coatings

## General

Protective coating systems for moisture and chloride resistance must be applied in at least two coats and, in addition to the other requirements of Clause 7, must satisfy the following minimum performance criteria:

1. the water absorption value not to exceed 0.01 ml m-2 sec-1 at 10 minutes, following the application and curing process in accordance with the manufacturer’s instructions and the Initial Surface Absorption Test (ISAT) as per BS 1881, Part 5;
2. chloride diffusion co-efficient less than 5 x 10-9 cm2/sec, and carbon dioxide (CO2) diffusion co‑efficient less than 2 x 10-7 cm2/sec after 2000 hours of accelerated ultra-violet (UV) weathering; and
3. dry film thickness (DFT) of at least 200 μm in accordance with AS 1580.108.2;

## Tidal Zone

In addition to the other requirements of Clause 7 and Clause 9.1, a coating system for the tidal zone must satisfy the following requirements:

1. the coating system must be formulated for application onto surface dry but saturated concrete such as in the tidal range in a marine environment;
2. the coating system must cure rapidly between the tidal cycles, such that it may be immersed in seawater within 3 hours of application and must be capable of withstanding hydrostatic penetration of water.

## Splash Zones

A dual protective coating system consisting of a pore-lining penetrant (i.e. silane, solid silane or silane cream) and at least two coats of a film-forming topcoat must be applied to splash zones.

In addition to the requirements of Clause 7 and Clause 9.1, the dual protective coating system must satisfy the following requirements:

1. Silane pore-lining penetrants must consist of at least 95% active ingredients and must be applied in two applications at a minimum application rate of 0.3 litres/m2 with a minimum interval between coats of at least 6 hours.
2. Solid silane or silane cream pore-lining penetrants must consist of at least 80% active ingredients and must be applied in one thick application at a minimum application rate of 0.4 litres/m2.
3. The amount of penetration of silane, solid silane or silane cream pore-lining penetrants into the concrete, must be a minimum of 5 mm.
4. The amount of penetration of silane/siloxane or siloxane pore-lining penetrants, must be a minimum of 3 mm.
5. The pore-lining penetrant must contain a fugitive dye to enable clear differentiation between coated and uncoated areas.
6. The pore-lining penetrant and film forming coating must be compatible.
7. The film-forming topcoat must satisfy the requirements of Table 8.2 for decorative/anti-carbonation coatings, except that its DFT must be at least 200 μm per coat.

A dual protective coating system incorporating a penetrating sealer may be used subject to submission of documentary evidence of previous performance in the Quality Plan, including relevant test results which must not be more than 24 months old, which demonstrate compliance with the requirements of this Specification.

## Protective Coatings for Special Applications

Any protective coatings requirements for special applications must be as specified on the drawings.

## Coatings Applied to Retaining Walls

Where coating systems are applied to the exposed concrete surfaces of retaining walls or other soil retaining structures, adequate waterproofing membranes and/or drainage systems must be installed behind the retaining wall to prevent the coating system from blistering or peeling off, where applied on exposed concrete surfaces.

## Coatings Applied to Parapet Walls

Where coating systems are applied on walls or other vertical concrete components which have exposed top horizontal surfaces, the coating systems must be taken over the top of the parapet and at least 150 mm down to the back of the wall to prevent the coating system from blistering or peeling off, unless the whole rear wall requires protection.

# Equipment

The spray equipment must be suitable for the application of the coatings in accordance with this Specification. It must be capable of properly atomising the coating material to be applied and must be equipped with accurate pressure regulators and gauges.

The spray gun, nozzles and needles must conform to the coating material manufacturer’s recommendations for the coating to be applied. The spray equipment must be kept in such condition to permit efficient and effective coating material application.

An efficient air line filter must be fitted as close as possible to the pressure pot to eliminate line condensate and oil in the air supply to the spray gun. The air of the spray gun impinging against the surface must show no condensed water or oils.

# Time Constraints

Subject to Clause 11.2, coating systems must not be applied until the period specified in Table 11.1 has elapsed after the placement of the concrete.

Table 11.1: Elapsed time before application of coating

|  |  |
| --- | --- |
| Substrate | Elapsed time before application of coating (days) |
| Newly constructed cast in-situ concrete/non-accelerated cured precast concrete | 28 |
| Steam or radiant heat cured concrete | 14 |
| Concrete repair using proprietary cementitious materials | 14 |
| Concrete repair using concrete  | 28 |

Coating application may be undertaken earlier if it can be established using a commercially available calibrated moisture meter that the concrete moisture content is less than 10%, but no earlier than 50% of the time periods stated in Table 11.1 and provided the concrete surface is dry at the time of application.

# Trial Application

A trial application of the coating system (including surface preparation) must be conducted on a test area of the actual substrate of not less than 10 m² or a test panel( minimum size 0.5 m2) made from identical substrate. The test area or test panel must be prepared, coated and tested in an identical manner to the full scale coating system and demonstrate that the coating system will comply with this Specification.

|  |
| --- |
| **HOLD POINT 2.** |
| Process Held | Commencement of the full scale coating works. |
| Submission Details | Submission of the test panel and/or notification of the trial application must be provided at least 14 days prior to the commencement of coating work.  |

Actual coverage rates of the coating system must be recorded in order that due allowance may be made in the full scale application for rough, irregular or highly absorbent concrete substrate. Any additional requirements or observations must be recorded and considered for the full scale application.

If the trial application does not comply with the requirements of this Specification, the deficiencies must be rectified (which may include testing of any new materials/methods) and a further trial coating must be prepared until the performance criteria of this Specification are met.

# Protection of the Works and Property

The Contractor must:

1. protect previously painted or galvanized surfaces, services, bearings, joints, painted signs and nameplates during the surface preparation process and during coating application processes;
2. remove all coating drips and droppings, smudges and over spray from all surfaces, including surfaces not being treated; and
3. ensure that the coated works are protected from adverse conditions, dust and debris during the curing period of the coating system in accordance with the requirements of Clause 15.

Spray painting must not be carried out within ten 10 metres of buildings, footpaths, roadways, pedestrians or vehicles without protective measures or methods being used.

|  |
| --- |
| **HOLD POINT 3.** |
| Process Held | Spray painting within 10 metres of other infrastructure. |
| Submission Details | Details of protective measures / methods must be provided at least 2 working days prior to the commencement of coating work.  |

At all times while work is underway on site, the Contractor must regularly remove all waste (including spent abrasive, liquids, packaging and general rubbish) from the site. Waste must be handled, transported and disposed of in accordance with any environmental requirements / regulations applicable to the works.

# Surface Preparation

The Contractor must provide the Principal with at least 14 days prior notification of its proposed date for commencing work on site

|  |
| --- |
| **WITNESS POINT 1.** |
| Process Held | Commencement of surface preparation. |
| Submission Details | Notification of the proposed date for commencing work on site must be provided at least 14 days beforehand.  |

Prior to treatment, concrete surfaces must be clean and free from contaminants such as oil, grease, dust, dirt, laitance, loose particles, remnants of curing / release compounds, mold, moss and algae.

The concrete surface must be prepared by high pressure jetting with potable water, either with or without added abrasive (i.e. up to 20 MPa), steam cleaning, wire brushing, abrasion with angle grinder, or by other means to provide a strong, hard surface. Areas of persistent contamination must be removed from the surface by the use of appropriate solvents or detergents followed by washing with potable water.

Any abrasive blast cleaning must be carried out in accordance with AS 1627.4 and applicable Work Health and Safety and Environmental requirements.

Any blow holes, areas of honeycombing, loose surface layers and weak concrete, shrinkage cracks of width less than 0.2 mm or other defects, either revealed by a grinding process or exposed by other surface preparation methods, must be filled with a suitable fairing coat cementitious repair material in accordance with the requirements of ATS 5340.

If the surface of the concrete is weak, more material must be removed and repaired in accordance with the requirements of ATS 5340. Such repairs must be sufficient to result in a strong, sound substrate suitable for the intended protective or decorative coating system. Projecting fins, rough spots and sudden steps must be removed by light abrasion with an angle grinder to provide a surface which can be easily coated.

Any Cracks must be treated in accordance with ATS 5430. Inactive cracks of width equal to or greater than 0.20 mm must be sealed by resin injection.

The following additional requirements apply to previously coated surfaces:

1. all traces of peeling or loose coating must be removed;
2. the compatibility and adhesion of the existing coating to the concrete surface must be evaluated by the cross‑cut adhesion test in accordance with AS 1580.408.4 and as stated in Clause 17;
3. a trial application and adhesion testing must be undertaken to establish the effectiveness of the bond between the existing and new coating in accordance with AS 1580.408.5 and Clause 12; and
4. if the compatibility and adhesion tests prove unsatisfactory the existing coatings must be removed and the concrete surface prepared appropriately to receive the new coating in accordance with this Clause 14.

# Environmental Constraints

Coating systems must not be applied under any of the following conditions:

1. windy conditions where over spray and/or spatter may be generated;
2. when wind-borne debris is likely to contaminate the uncured surface of the freshly applied coating;
3. when the ambient temperature exceeds 35°C or is below 10°C unless otherwise expressed in writing by the manufacturer;
4. when the relative humidity exceeds 85% or where it may be expected to exceed 85% during the subsequent 12 hour curing period;
5. when rain spatter or run-off, including leakage through deck joints, contaminating the surface and adversely affecting the adhesion to the substrate, may occur;
6. when the surface temperature of the substrate is less than 3°C above the dew point calculated in accordance with AS 2312 or exceeds 40°C.

The environmental conditions must be measured, recorded and assessed against the above requirements once every four hours of each shift or more frequently during periods when the weather is rapidly changing. A calibrated commercially available hygrometer (psychrometer) or electronic climatic measuring gauge must be used to determine the parameters which require readings.

The Contractor’s procedures must include provisions for the management of adverse environmental conditions, including the suspension of work where appropriate.

The Contractor must adhere to the manufacturer’s instructions regarding drying and curing requirements, and overcoating time intervals, for the prevailing environmental conditions.

# Application of Coatings

Unless the coating is specifically formulated for tolerance to moisture during application, the concrete surface must be dry prior to the application of a coating.

If a moisture tolerant coating is used, the concrete surfaces to receive coating must be surface-dry at the time of application and any deposits of salt crystals which collect on coated surfaces must be washed off with potable water and the surface allowed to dry, prior to further coating application.

Coverage rates must be checked for compliance with the manufacturer’s requirements. The surface area of the concrete structure subject to application and the volume of coating used must be recorded by the Contractor.

The coating system must be applied as soon as possible (i.e. within 24 hours unless otherwise expressed in writing by the manufacturer) after the preparation of the concrete surface. The prepared surface must be protected against contamination if it is left uncoated for more than 24 hours.

Where more than one coat is applied, successive coats must have slightly different colour shades to assist in achieving uniform coverage. The difference in colour must be such that a coat when either wet or dry must be clearly distinguishable by means of colour difference, from the preceding coat.

Multi-part coating materials must not be applied after the pot life has expired.

A coating must not be applied over any coating which is damaged or has not be applied in accordance with this Specification until that coating has been repaired in accordance with Clause 18.

Further to the other requirements of this Clause, any pore-lining penetrants (i.e. silane, silane/siloxane, siloxane, solid silane or silane cream) must be applied:

1. to a surface which is dry for a minimum of 24 hours before application commences;
2. using an airless pump system with an operating pressure not exceeding 70 kPa in order to ensure that no atomization or misting of the material occurs;
3. in a series of continuous operations;
4. by a continuous spray technique giving saturation flooding, working from the lowest level and proceeding upward toward higher elevations; and
5. so that there is a ‘wet look’ for a few seconds after application.

Coating materials must not be excessively thinned and any thinners used must be the correct type as specified by the material manufacturer. The coating material must be strained as specified by the material manufacturer.

Where quantities of coating material are being applied by spraying successive batches of premixed multi‑part material, the equipment must be flushed and purged with clean solvent after 2/3 of the pot life of the material has expired from either the mixing of the first batch or since the last purge and cleaning of the equipment. Coating material ingredients must be kept properly mixed in the spray pots or container during the application of the material whether by continuous mechanical agitation or intermittent manual agitation as required.

Where brush or roller techniques are used, the brushes or roller heads must be used for the day only and then discarded. The equipment must not be cleaned for re‑use.

Each coat must have the specified DFT, including edges and corners. Coats which exhibit excessive film builds must be removed.

Each coat must be smooth, uniform and free from sags, runs, mud cracking, wrinkling, fat edges, blisters, pinholes, holidays, dry spray, entrapped foreign bodies and heavy brush marks.

# Testing

## Testing prior to Application

At least one test per sample must be carried out immediately prior to the commencement of each day’s coating application to ensure that:

1. the surface moisture conditions of concrete satisfies the manufacturer’s recommendations;
2. moisture content of concrete is free of water back pressure to satisfy the manufacturer’s recommendations, in accordance with ASTM D4263‑83;
3. the environmental conditions, as specified in Clause 15, are satisfied.

For previously painted surfaces, the cross-cut adhesion of the existing coating must be tested in accordance with AS 1580.408.4. The surface is deemed to be satisfactory if 75% of the cross-cut surface remains attached to the concrete and provided the surface is free from cracking, blistering or heavy chalking.

At least three measurements per sample of cross-cut adhesion must be carried out for every 25 m² of previously painted surface for the first 100 m² and then at least three measurements per sample for every 100 m² thereafter.

## Testing after Application

Following application of the final coat, the coating must be tested for compliance with Table 17.4 and the following:

1. 85% of DFT measurements must be more than 90% of the specified thickness; and
2. 85% of DFT measurements taken in the 1 m2 test area must be more than the specified thickness.

Table 17.4: Testing of Coating

|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Minimum Frequency** | **Test Method** | **Acceptance Criteria** |
| Bond strength:Coating applied to concrete |  1 test per 50 m²  | Aluminium dollies with a minimum diameter of 50 mm in accordance with AS 1580.408.5. | ≥ 0.75 MPa |
| Bond strength:Coating applied to previously painted surface |  1 test per 50 m²  | Aluminium dollies with a minimum diameter of 50 mm in accordance with AS 1580.408.5. | Failure occurs at the interface of the concrete substrate and the existing coating |
| WFT | 1 test per 50 m² | ASTM D4414 | As specified by the material manufacturer |
| DFT:Decorative/Anti-Carbonation Coatings | 1 test per 50 m² | AS 1580.108.2 using a paint inspection gauge | ≥ 150 µm  |
| DFT:Moisture and Chloride Resistance Coatings | 1 test per 50 m² | AS 1580.108.2 using a paint inspection gauge | ≥ 200 µm  |
| Water Absorption Value: Moisture and Chloride Resistance Coatings only | 1 test per 50 m² | Surface Absorption Test (ISAT), as set out in BS 1881, Part 5 | ≤ 0.01 ml m-2 sec-1 at 10 minutes |
| Penetration: Pore-lining penetrant only | 1 test per 50 m² | Examination of concrete core 50 mm in diameter x 50 mm deep | In accordance with Clause 90. |

Notes:

1. Bond Strength and Water Absorption are tested 14 days after application.
2. The DFT of a coating may be measured using the coating remnants attached to the aluminium dollies from the adhesion testing provided the coating remains intact.
3. The number of tests of each property must not be less than 3 in total.
4. Where an anti-graffiti coating is also used as an anti-carbonation coating, its DFT must not be less than 150 µm and must comply with the requirements of ATS 5343 for anti-carbonation coatings.

The minimum rate of sampling and testing is 1 m² test area for every 50 m² on completion of the application of the final coat.

# Coating Repairs

Non-compliant work includes:

1. a failure to comply with any specified environmental constraint;
2. a failure to comply with the manufacturer’s instructions or any requirement of this Specification; and
3. yellowing, loss of adhesion, or colour change of the coating at any time during the defects liability period.

Any non-compliant work must be repaired so that the work complies with this Specification. This may include removal of the coating, followed by surface preparation and application of a new coating.

Prior to commencement of the repair work, the Contractor must prepare a procedure for that repair work and provide details of the scope of the repair work.

|  |
| --- |
| **HOLD POINT 4.** |
| Process Held | Commencement of repair work. |
| Submission Details | Details of the scope of the repair work and a procedure for the repair work must be provided at least 7 days prior to the commencement of the repair work. |

# Requirements for Future Maintenance of Coatings

Prior to the completion of the works, the Contractor must provide the manufacturer’s recommendations in regard to the following:

1. the methods of preparation to be used in the event that re-coating of the coated surface is required;
2. Which types of coating, other than the original product, are compatible with the finish coat for re-coating purposes; and
3. the technique which can be used to repair local damage to the coating, with particular reference to colour and gloss matching of finish coats applied after a time lapse of 5 years.
4. The most appropriate techniques for cleaning of the finish coat to remove surface soiling, with particular reference to ease of removal of graffiti or glued posters, where possible, without damage to the existing finish.

Annexure A: Summary of Hold Points, Witness Points and Records

The following is a summary of the Witness Points / Hold Points that apply to this specification and the Records that the Contractor must supply to the Principal to demonstrate compliance with this specification.

|  |  |  |  |
| --- | --- | --- | --- |
| Clause | Hold Point | Witness Point | Record |
| 4 | 1. Commencement of work on site.
 |  | Quality Plan |
| 6.2 |  |  | Certificate from the manufacturer for each batch of materials |
| 6.3 |  |  | Traceability records |
| 6.4 |  |  | Manufacturer’s guarantee |
| 12 | 1. Commencement of surface preparation
 |  | Trial application and/or test piece |
|  | 1. Spray painting within 10 metres of other infrastructure.
 |  | Details of protective measures / methods |
| 14 |  | 1. Notification of the proposed date for commencing work on site
 |  |
| 17.1 |  |  | Test results for surface moisture, concrete moisture content and record of environmental conditions. |
| 17.4 |  |  | Test results for bond strength, WFT and DFT, amount of penetration of pore-lining penetrant and water absorption |
| 18.3 | 1. Commencement of repair work
 |  | Scope and a procedure for the repair work |
| 19 |  |  | The manufacturer’s recommendations for future maintenance |

Amendment Record

|  |  |  |  |
| --- | --- | --- | --- |
| Amendment no. | Clauses amended | Action | Date |
| - | New specification | New | January 2020 |
|  |  |  |  |

|  |  |
| --- | --- |
| **Key** |  |
| Format | Change in format |
| Substitution | Old clause removed and replaced with new clause |
| New | Insertion of new clause |
| Removed | Old clauses removed |