



Unitywater

Serving you today, investing in tomorrow.

# Pr9769 - Specification for Concrete Surface Protection



# Pr9769 - Specification for Concrete Surface Protection

Document Sponsor	Infrastructure Standards and Products Approval Committee
Document Owner	Head of Asset Management
Subject Matter Expert	Principal Design Engineer
References	Refer to Appendix B of this document

## Version Review

Revision	Reviewed by	Approved by	Date approved	Revision type/summary
1.0	B. Maule	A. Schoenmaker	13/12/2017	Original version
2.0	B. Maule	A. Schoenmaker	15/01/2018	Change to doc title (remove Network Rehabilitation) and revision page included
3.0	B. Maule	G. Burnett	07/11/2019	Appendix B References, reflect current legislation Section 5 Completed Works, (removed) deemed to be Contractual requirements
4.0	B. Maule & N. Wilkins	N/A	03/09/2020 Minor amendment	Update reference WSA 201-2013-1.1 to WSA 201-2017. Approved by Policy & Docs Advisor as minor amendment, no change to review dates.
5.0	R. Stringfellow	G. West	07/02/2022	Periodic review: <ul style="list-style-type: none"> <li>update to include concrete repair and latest information from coating inspector, suppliers and contractors.</li> <li>included input from selected stakeholders, suppliers, contractors and NuSpec.</li> <li>Doc Branch owner transferred from Capital Delivery to Asset Knowledge &amp; Performance.</li> </ul>
6.0	L. Bryson Y. Skinner	N/A	N/A	02/06/2022 Minor amend to update legislation title <i>Queensland Building Services Authority Act 1991</i> to <i>Queensland Building and Construction Commission Act 1991</i> (Qld).
7.0	L. Bryson	N/A	N/A	24/05/2023 Minor amend to replace manhole terminology with maintenance hole.
8.0	J. Munro Document Control Officer	N/A	N/A	14/09/2023 Minor admin amendment to align with current template.
9.0	J. Munro Document Control Officer	N/A	N/A	02/11/2023 Minor amendment to update Material Safety Data Sheet (MSDS) to Safety Data Sheet (SDS) as per current terminology
10.0	K. Goraya, Head of Asset Management	Head of Asset Management	13/11/2023	Periodic review, no changes



# Pr9769 - Specification for Concrete Surface Protection

## Contents

<b>1. Purpose</b> .....	<b>4</b>
<b>2. Scope</b> .....	<b>4</b>
<b>3. Technical Details</b> .....	<b>4</b>
3.1. Skills and Qualifications .....	4
3.2. General Requirements.....	5
3.3. Preparation Works .....	6
3.4. Concrete Repairs.....	8
3.5. HDPE and PVC Cast-in Protective Liners .....	9
3.6. Formwork .....	9
3.7. Placement of Cast-in Protective Liner against Formwork .....	10
3.8. Grout .....	10
3.9. Grout Mixing .....	11
3.10. Grout Placement.....	11
3.11. Penetrations and Other Openings.....	12
3.12. Welding .....	12
<b>4. Quality Management</b> .....	<b>12</b>
4.1. Inspection and Testing.....	12
4.2. Independent Auditing.....	13
<b>5. Appendices</b> .....	<b>13</b>
Appendix A – Definitions/Acronyms .....	14
Appendix B – References .....	15



# Pr9769 - Specification for Concrete Surface Protection

## 1. Purpose

The purpose of this Specification is to detail Unitywater's minimum requirements for the application of concrete surface protection to existing and new sewerage network assets.

Unitywater will consider new and innovative technologies for the successful completion of these services.

## 2. Scope

- 2.1.1 The services described in this Specification are referred to as the Works in this Specification.
- 2.1.2 The Works comprise the provision of all material, plant and labour and the performance of all operations necessary for concrete surface protection work to Unitywater's new and existing concrete structures.
- 2.1.3 The Works encompass the minimum requirements for the surface preparation, coating application, inspection and testing of protective coatings to concrete surfaces and applies to the following:
  - Maintenance Structures; or
  - Sewage pumping station wet wells; or
  - Sewage treatment plant structures; or
  - Other concrete surfaces as required.
- 2.1.4 Unitywater will nominate the service to be provided:
  - Applied coating system;
    - to new or existing uncoated concrete surface;
    - to replace failed coating (patch repair or full coating replacement);
    - to rebuilding of lost concrete or surface restoration;
  - HDPE and PVC Cast-in Protective Liners.

## 3. Technical Details

### 3.1. Skills and Qualifications

- 3.1.1 Personnel must be appropriately qualified to perform the required works.

#### Applied Coatings

#### *Applicators*

- 3.1.2 Coating Applicators shall be accredited by the Painting Contractors Certification Program (PCCP) to the class relevant to the work to be undertaken or shall demonstrate that its personnel have the required manufacturer certification, experience, training, track records and equipment in applying the nominated product.
- 3.1.3 In addition, where the work involves the maintenance or removal of coatings containing lead compounds or other toxic substances, shall be undertaken to the requirements of AS 4361.1.



## Pr9769 - Specification for Concrete Surface Protection

### **Coating Inspectors**

- 3.1.4 Coating Inspections shall be undertaken by certified inspectors who are certified to AMPP Concrete Coating Inspection (CCI) or an equivalent certification related to project works; and
- 3.1.5 The inspector shall hold Professional Indemnity Insurances to Unitywater acceptable coverage level.

### **HDPE and PVC Cast-in Protective Liners**

#### **Installers**

- 3.1.6 Installation and welding of the protective liner shall only be performed by experienced and qualified installers that are certified by the manufacturer of the protective liner.
- 3.1.7 Qualifications shall be recognised as equivalent to the requirements of EN 13067.

## **3.2. General Requirements**

- 3.2.1 The Contractor shall be responsible for:
- Locating all assets and performing the specified services on each asset;
  - All required approvals/permissions from relevant stakeholders;
  - Traffic management as required;
  - Network intervention approvals;
  - Commissioning independent Coating Inspector prior to commencement of works;
  - Preparation, application and testing of protective coatings;
  - Management of sewage and site conditions at each asset;
  - Re-sealing of any removed maintenance structure lids using a Unitywater approved water proof maintenance hole grease:
    - Application of the grease shall be in accordance with the manufacturer's specification;
  - Restoration of all surfaces and fixtures (including buildings, fences, gardens, walls, paved surfaces, paths and other structures, grass and trees and other property) impacted by the work; sites shall be reinstated:
    - To a condition as close to equal to that existing prior to the commencement of works;
    - To the satisfaction of Unitywater; and
    - Immediately following completion of concrete surface protection works.
- 3.2.2 The expected service life of applied coatings shall not be less than:
- 20 years for Applied Coatings;
  - 50 years for HDPE and PVC Cast-in Protective Liners.





## Pr9769 - Specification for Concrete Surface Protection

### 3.3. Preparation Works

#### *Internal Fixtures*

3.3.1 Internal fixtures shall be dealt with as follows:

- step irons to be permanently removed;
- all other fixtures to be removed only where necessary to complete the coating works and reinstated accordingly.

3.3.2 All objects not removed must be masked and suitably protected from any possible overspray, impact or damage from pressure water cleaning. Items that are removed shall be photographed in-situ prior to their removal to assist with proper reinstallation to the original location.

3.3.3 All masking shall be removed by the Contractor as soon as possible after application of the coating. Masking materials shall be progressively removed as work is completed. Removal of masking materials includes all adhesive residue and tape material.

3.3.4 Items damaged during removal or reinstatement shall be repaired, cleaned or replaced at the Contractor's expense.

#### *Surface Preparation*

3.3.5 All surface preparation shall be in accordance with *WSA 201-2017 Manual for Selection and Application of Protective Coatings* and the coating product manufacturer's requirements inclusive of but not limited to:

- Surface residues;
- Surface moisture content;
- Removal of hydrocarbons;
- Surface roughness and relevant CPS limits;
- Surface cleanliness including surface finish and smoothness;
- Humidity;
- Surface pH;
- Dust;
- Or any other condition that may impair the effectiveness of the coating system.

3.3.6 On completion of surface preparation works, the entire area shall be inspected by the Independent Inspector or superintendent to agree on extent of concrete repairs before repair commences.

3.3.7 WSA 201 and ASTM D 4258 Standard Practice for Surface Cleaning Concrete for Coating provides guidance on suitable concrete cleaning methods.

3.3.8 Surface preparation shall involve removal of old / poor coating, removal of unsound concrete, leaving undamaged sound coating and surfaces. All prepared surfaces should be alkaline to coating manufacturer's warranty requirements (minimum phenolphthalein positive / pH >8.3) and free of surface microcracking.



## Pr9769 - Specification for Concrete Surface Protection

3.3.9 Where existing coating is to remain surface tensile strength testing shall be performed on representative surfaces to ensure the overall tensile strength of the prepared substrate is suitable to allow for the application of the protective coating system. A minimum tensile strength of 1.5 MPa shall be achieved on all tested areas with a minimum of 1 tensile test performed per 10m<sup>2</sup>.

3.3.10 Pressure water cleaning shall not remove excessive sound concrete but should be sufficient to remove all degraded and contaminated concrete. Care shall be taken to ensure that the method of preparation does not cause weakness due to fracture of the concrete or aggregate.

### **Disposal of debris**

3.3.11 All debris dislodged during the preparation of the concrete surface shall be collected so that it is prevented from entering the sewer network or pumps.

3.3.12 Debris shall be removed and disposed of by the Contractor.

3.3.13 The cost of disposing of refuse is borne by the Contractor.

### **Repairs of Surface**

3.3.14 Surface imperfections shall be reinstated to original surface or agreed level using a cementitious, epoxy or alternative approved material.

3.3.15 The contractor shall allow for removal of a minimum 5mm thickness of unsound / degraded coating / concrete be removed and minimum screed lining repair to a thickness to 5mm should be expected. This allows for resurfacing and smoothing the finish followed by the application of the suitable epoxy / cementitious sewage resistant liner.

3.3.16 Where the coverage losses are greater than 15 to 20mm the contractor shall allow for repair method to rebuild to similar structural and reinforcement effective cover to the original surface including smoothing the area.

### **Applied Coatings**

3.3.17 Prior to the commencement of the work, a written specification and coating schedule prepared by the coating supplier (Supplier) shall be submitted by the Applicator for each coating system proposed for use. It shall contain the requirements for the supply, storage, mixing, equipment, surface preparation, application, wet and dry film thickness values, recoat times, curing, inspection, testing requirements, repair of defects, and details of any deviation from this specification. Application shall not commence without the approval of Unitywater.

3.3.18 Prior to commencement of the work, the coating Applicator shall prepare an ITP for each coating system and structure to be coated. The ITP shall show the type, sequence and number of tests to be taken in each area and how the pass or rejection criteria are determined. It shall also identify "hold points" and "witness points" required throughout the works. ITP shall include all relevant items in Unitywater ITP016 - Protective Coating Concrete Structure (Epoxy) or ITP017 - Protective Coating Installation (Polyethylene).

3.3.19 Only coating systems approved under the IPAM list shall be used. They shall be applied in accordance with the WSA 201-2017 Manual for Selection and Application of Protective Coatings and the product manufacturer's requirements.



## Pr9769 - Specification for Concrete Surface Protection

3.3.20 Unitywater will specify instances where failed coatings shall be reinstated by performing a patch repair.

### 3.4. Concrete Repairs

3.4.1 Repair damaged and deteriorated concrete as follows:

- a. Breakout any delaminated concrete - the perimeter of the breakout to be saw cut to a manufacturer's minimum depth (10 mm if unstated), to delineate the edges to avoid feathered edges and to square off the repair area ensuring first that this will not cut or damage any existing reinforcement or services.
- b. Where corroded reinforcement is found, the breakout area shall continue to a depth of at least 25 mm beyond the reinforcement. Where there is a potential for excessive removal of substrate material, or the reinforcement has more than surface corrosion a RPEQ registered structural engineer shall design repair method.
- c. Remove corrosion product and foreign particles from the exposed reinforcement to achieve a grey metal appearance using abrasive blast cleaning, a steel wire brush or needle gun.
- d. Carry out an inspection of all bars after cleaning. Wherever individual bars have lost 15% cross sectional area, or more, of their diameter, overlap and augment with new bars to a Structural Engineer's instructions.
- e. Brush coat all prepared reinforcement which is to be embedded in concrete, with a protective coating specified by the repair mortar Manufacturer.
- f. Clean all exposed concrete surfaces of all concrete dust, debris, laitance and other surface contaminants and provide a sound substrate for the appropriate repair material after removal of the defective concrete. The prepared surface shall be roughened to an amplitude of approximately 5 mm (typically ICRI Guideline No. 310.2, Concrete Surface Profile, CSP 8 to 10).
- g. Soak all exposed surfaces with potable water for at least 2 hours to leave the surface in a saturated surface-dry condition immediately prior to placement of a cementitious bonding agent as specified by the repair mortar manufacturer.
- h. Reinstatement of the removed concrete to the original as-built profile using a proprietary shrinkage-compensated high-build proprietary repair mortar. The material is to be suitable for the intended use and exposure conditions and is to satisfy the following minimum performance criteria:
  - (i) The 28-day compressive strength to be at least 35 MPa.
  - (ii) Drying shrinkage at 28 days' age to be less than 600 microstrain when tested in accordance with AS 1478.2.
  - (iii) Bond strength to substrate (by direct pull-off) greater than 1.5 MPa.

3.4.2 The repair material manufacturer's recommendations shall be adhered to at all times during the substrate preparation, mortar application and curing processes.

3.4.3 ACI RAP Bulletin 6, Field Guide to Concrete Repair Application Procedures, Vertical and Overhead Spall Repair by Hand Application and ACI RAP Bulletin 7, Field Guide to Concrete Repair Application Procedures, Spall Repair of Horizontal Concrete Surfaces provided further guidance on concrete repairs.



## Pr9769 - Specification for Concrete Surface Protection

3.4.4 Static cracks wider than 0.3 mm (atmospheric exposure) or 0.2 mm (immersed structures, water retaining or excluding structures) shall be repaired. The path along the crack shall be chased forming a dovetail -shaped slot of 20 mm wide x 20 mm deep. The slot is then filled with polymer modified repair mortar. The surface shall be struck flush with the cleaned concrete adjacent to the crack. Any active crack shall be treated as a joint and repaired using a waterproof joint sealant system. Any infiltration at the crack shall be stopped first prior to undertaking crack repair in accordance with the methodology approved by the Water Agency.

### 3.5. HDPE and PVC Cast-in Protective Liners

- 3.5.1 The cast-in protective liner shall be a self-anchoring sheet material purposely manufactured as a corrosion protection liner in chemically aggressive service location and be provided with a proven welding and testing system which can be undertaken in-situ, providing a seamless and impervious liner.
- 3.5.2 The cast-in protective liner sheet shall have integral anchors that are shaped to embed themselves in grout upon pouring and cure of the grout.
- 3.5.3 The anchors are to be a minimum of 10 mm long allowing the placement of grout between the substrate and the liner and providing a firm anchorage to the grout.
- 3.5.4 The anchor density shall be a minimum of 500 per m<sup>2</sup> and the pull out resistance per anchor shall be a minimum of 0.7 kN.
- 3.5.5 The thickness of the cast-in protective liner shall be minimum 2.5 mm, unless determined by the Liner Manufacturer considering the exposure environment and service conditions.
- 3.5.6 Surfaces requiring the installation of a cast-in protective liner are to be prepared in accordance with Section 3.3 Preparation Works.

### 3.6. Formwork

- 3.6.1 The cast-in protective liner being grouted against vertical surfaces must be fully supported by temporary formwork to carry the load of the wet grout. This will ensure that a neat and even-finished surface is achieved.
- 3.6.2 The formwork shall be placed to ensure that the gap between the existing prepared surface and the cast-in protective liner is greater than the length of the anchors.
- 3.6.3 The cast-in protective liner shall be adequately supported to prevent buckling as the fluid grout is poured into the annulus formed by the knobs resting against the existing surface.
- 3.6.4 The Contractor shall design, supply, fix and align any formwork/supports in accordance with the requirements of AS 3610 *Formwork for Concrete*.
- 3.6.5 All formwork shall be placed in such a manner that cast-in protective liner anchors are not deformed against the existing substrate and that a minimum clearance of the length of the anchors is achieved between the back of the liner sheet and the existing prepared concrete substrate.



## Pr9769 - Specification for Concrete Surface Protection

### 3.7. Placement of Cast-in Protective Liner against Formwork

3.7.1 Placement of the cast-in protective liner to the formwork shall be in accordance with the product manufacturer's recommendations and consideration given by the Contractor to ensure that:

- The cast-in protective liner sheet width shall be sized for minimal site joints;
- Shop drawings/sketches shall be prepared prior to fixing to formwork to plan the sheet sizes and location of joints, overlaps required for welding and penetrations for pipework;
- Formwork is clean and free from defects that could damage the cast-in protective liner or prevent it from remaining flat;
- The cast-in protective liner is rolled out flat and weighted for forty-eight (48) hours to remove rolled memory in the material prior to placement against the formwork;
- The cast-in protective liner is pre-tensioned onto the formwork in a manner as recommended by the product manufacturer, within the elastic range of the material, to allow for temperature expansion and contraction without having folds, creases or lumps in the cast-in protective liner during the grout pouring operation;
- Nails are not used to secure the cast-in protective liner to the formwork except in locations where future welding or cover strips will cover any or all fixing holes in the cast-in protective liner;
- Specially designed adhesive strips (double-sided tapes) shall be used to attach the cast-in protective liner to the formwork;
- The cast-in protective liner is secured at joints by removing anchors as necessary, using manufactured profiles, sheet overlap or gasket strips such that concrete fines are prevented from travelling between the formwork and the cast-in protective liner;
- Prefabricated corner pieces shall be used to minimise corner welding that all free edges (sides and bottom) are closed off with an approved material, such as foamed polyethylene supported by wood, to prevent leakage of the grout;
- The cast-in protective material shall be free from holes, blisters and folds.

### 3.8. Grout

3.8.1 The cast-in protective liner shall be bonded to the prepared existing concrete surfaces by placing grout between the existing concrete and the cast-in protective liner in accordance with the product manufacturer's requirements.

3.8.2 To ensure contact between the concrete substrate, the grout and the cast-in protective liner a non-shrink cementitious grout that is designed to eliminate shrinkage and for "form and pour" applications shall be used.



## Pr9769 - Specification for Concrete Surface Protection

- 3.8.3 The grout to be used shall be a pre-mixed cementitious grout that is manufactured from a blend of cements, graded fillers, aggregates and chemical additives complying with the relevant Australian Standards and formulated to have the following properties:
- Non-shrink (hardens free of bleeding, settlement, plastic shrinkage and drying shrinkage);
  - Flowable consistency (compacts to fill form and around anchors without the need for vibration);
  - Useable life (remains placeable to allow transport and pouring into formwork);
  - High early strength (provides a minimum 7 day compressive strength of 30 MPa);
  - High final strength (provides a minimum 28 day compressive strength of 50 MPa).
- 3.8.4 The product (liner) manufacturer shall specify a grout and a primer that is suitable for the application.
- 3.8.5 No bonding or conditioning agent shall be used without written approval from the product (liner) manufacturer.
- 3.8.6 All surfaces are to be clean and free of dust and other contaminants immediately prior to placement of the grout.

### 3.9. Grout Mixing

- 3.9.1 The grout shall be prepared by following the product (grout) manufacturer's requirements.
- 3.9.2 Unless explicitly stated by the product (grout) manufacturer, potable water shall be used to prepare the grout.
- 3.9.3 A sample of the representative grout used for each day of the works shall be taken for compressive strength testing.
- 3.9.4 All specimens shall be manufactured by a competent experienced person employed by the Contractor and they shall be delivered to the NATA accredited laboratory for curing, capping and testing.
- 3.9.5 One sample set shall be tested at 7 days and two sets tested at 28 days.
- 3.9.6 Compressive strength test results obtained must exceed the nominated strength requirements for each age.
- 3.9.7 Unitywater must be provided with copies of all compressive strength test results.
- 3.9.8 Any grout batches that are determined not to meet the nominated strength requirements shall be reported to Unitywater.

### 3.10. Grout Placement

- 3.10.1 Placement of grout shall be in accordance with the product (lining) manufacturers requirements.
- 3.10.2 Where cement based repair grout is used, the concrete shall be wetted for a minimum of 30 minutes to achieve a saturated surface condition prior to application of the grout.
- 3.10.3 The surface should then briefly be allowed to dry until there is no free water visible on the surface immediately before grout application.



## Pr9769 - Specification for Concrete Surface Protection

- 3.10.4 A suitable primer (if required) shall be applied to the substrate surface following the product (grout) manufacturer's requirements.
- 3.10.5 The area to be grouted shall be thoroughly inspected before the application of the primer (if required) and grout.
- 3.10.6 Unitywater shall be advised prior to application of grout and may wish to inspect the level of surface preparation.
- 3.10.7 The grouting works must be planned for periods of minimum change in ambient temperature to limit expansion or contraction of the cast-in protective liner during the grout setting/curing period.
- 3.10.8 No grouting works shall be undertaken where the cast-in protective liner is exposed to direct sunlight from the start of the grouting operation through to final set of the grout.
- 3.10.9 Where possible, grout shall be placed from the bottom up towards the top with a 'tremmie' pipe.
- 3.10.10 Grout must be freshly mixed and fluid enough to flow past the anchor knobs with ease. The pour shall be controlled to allow trapped air to escape. This may be aided by tapping on the formwork/bracing.
- 3.10.11 The grouting application shall be a continuous operation such that no cold joints occur.
- 3.10.12 Once the grout has set, the bracing, supports and temporary gaskets may be removed.

### 3.11. Penetrations and Other Openings

- 3.11.1 The Contractor shall use a work methodology approved by the product (liner) manufacturer for sealing of lining penetrations.
- 3.11.2 The sealing detail must demonstrate that it provides a sufficient barrier so that concrete degradation behind the cast-in protective liner is prevented for the service life of the liner.

### 3.12. Welding

- 3.12.1 Welding process, welding strips and other accessories used shall be in accordance with the product manufacturer's requirements.
- 3.12.2 The Contractor shall ensure that the surfaces to be welded are dry and the structure is adequately ventilated for welding works.
- 3.12.3 All surfaces to be welded must have the oxidised layer removed prior to welding and have the extrusion weld in place within 20 minutes of removing the oxidised layer.

## 4. Quality Management

### 4.1. Inspection and Testing

- 4.1.1 The Contractor shall conduct sufficient inspection and testing work (and subsequent repair work where necessary) in order to be satisfied that work performed on each asset complies to WSA201, approved ITP and Specification requirements.
- 4.1.2 The Contractor shall notify Unitywater of any QA/QC testing scheduled for each asset in order to verify that acceptance criteria have been met and that the relevant documentation is completed accurately.



## Pr9769 - Specification for Concrete Surface Protection

- 4.1.3 All work governed by this Specification shall be inspected and documented by the Contractor in accordance with approved ITP's. Documentation shall include QA/QC data such as batch numbers, environmental conditions, times/ dates of application, material product details etc.
- 4.1.4 Where protective coatings or liners have been installed they must be inspected and holiday tested for effectiveness. The ITP's should detail the testing methods that will be employed. Consideration shall be given, but not limited to:
- Visual inspection;
  - Tap testing;
  - adhesion testing;
  - holiday testing;
  - Other techniques as required by product manufacturers.
- 4.1.5 Unitywater may request to witness nominated activities on the ITP's.

### 4.2. Independent Auditing

- 4.2.1 At the request of Unitywater, the Contractor shall engage the services of an Independent Inspector to conduct independent testing of coated surfaces.
- 4.2.2 The scope of these audits shall be at the sole discretion of Unitywater.
- 4.2.3 The Inspector, proposed by the Contractor should as a minimum:
- have no less than 5 years' experience; and
  - hold appropriate qualifications for the relevant scope of services; and
  - be approved by Unitywater.
- 4.2.4 The Independent Coating Inspector will conduct independent verification of compliance to the specification.
- 4.2.5 The Contractor will arrange for the findings from the independent audits to be provided jointly to the Contractor and Unitywater when completed. The independent inspector shall have the minimum qualifications detailed in Section 3.1.4 Coating Inspectors.

## 5. Appendices

Refer to the following pages.





# Pr9769 - Specification for Concrete Surface Protection

## Appendix A – Definitions/Acronyms

Definitions and abbreviations contained in WSA 201 *Manual for Selection and Application of Protective Coatings* shall be considered relevant to this Specification and are not replicated below.

Term	Meaning
ACI	American Concrete Institute
AMPP	National Association of Corrosion Engineers (NACE) and Steel Structures Painting Council (SSPC) are now AMPP, The Association for Materials Protection and Performance.
Applicator	The coating application Contractor or the employee of the coating application Contractor who prepares the surface for painting and applies the specified coatings.
Applied coating	A coating system that is applied as a series of coats to achieve the required dried film thickness.
ArcGIS Collector	Application used by Unitywater for the purpose of asset data collection.
Cast-in Protective Liner	HDPE or PVC, concrete protection liner with anchors or ribs that are cast into concrete substrate.
Coat of Paint / Coating	A continuous layer of dried paint film resulting from a single. Application of paint.
Coating System	A total number and types of paint coatings or other protective or decorative materials, applied separately in a predetermined order to produce a laminated coating membrane.
Coating Inspector	An appropriately qualified and experienced person or organisation to provide independent inspection, testing and reporting of the works.
Grout	A fluid form of concrete used to fill gaps.
IPAM	Infrastructure Products and Materials List – SEQ Accepted Products and Materials Lists.
ITP's	Inspection and Test Plans.
Maintenance Structure	Any structure with a removable cover constructed on a conduit (pipeline) that provides access to personnel and/or equipment. <i>(Includes maintenance holes, maintenance chambers, maintenance shafts, terminal maintenance shafts, inspection shafts, inspection openings)</i> . Also known as access structures and maintenance holes.
Patch Repair	Local repair to an existing coating.
PCCP™	Painting Contractors Certification Program.
Product Manufacturer	The supplier or manufacturer of coating whose name appears on the product container, data sheets and the Safety Data Sheets (SDS).
QA/QC	A combination of quality assurance, the process used to measure and assure the quality of the product, and quality control, the process of ensuring products and services meet customer expectations.
SEQ WS&S D&C	South-East Queensland Water Supply and Sewerage Design and Construction Code.
Service life	A manufacturer's product expected in-service lifetime.
Substrate	Base material over which a coating is applied.
WSA	Water Services Association of Australia



# Pr9769 - Specification for Concrete Surface Protection

## Appendix B – References

### General

All design, equipment and workmanship shall conform to the most recent requirements of relevant local, State and Commonwealth statutory requirements and applicable, current Australian Standards.

Where no Australian Standard exists, work shall conform to the most applicable, current IEC Standard.

Where conflict exists between different Codes, Standards or Regulations, the higher requirement shall apply.

The following legislation, related Regulation and Codes apply to this specification:

- *Plumbing and Drainage Act 2018* (Qld);
- *Plumbing and Drainage Regulation 2019* (Qld);
- *Work Health and Safety Act 2011* (Qld);
- *Work Health and Safety Regulation 2011* (Qld);
- *Water Supply (Safety and Reliability) Act 2008* (Qld);
- *Environmental Protection Act 1994* (Qld);
- *Queensland Building and Construction Commission Act 1991* (Qld);
- SEQ WS&S D&C Code;
- SEQ Infrastructure Products and Materials List (IPAM);
- WSA 04 SEQ Sewage Pumping Station Code of Australia;
- WSA 02 SEQ Sewerage Code of Australia;
- Unless specifically amended by this Specification, the order of precedence for applicable standards shall be:
  - WSA 201-2017 Manual for Selection and Application of Protective Coatings;
  - SEQ Water Supply and Sewerage Design and Construction Code (SEQ WS & S D & C Code).

This Specification must be read in conjunction with the latest version of WSA 201-2017 Manual for Selection and Application of Protective Coatings.

No deviations from this Specification shall be made without prior consultation and written approval by Unitywater.

Where there is a conflict between this Specification and the product manufacturer's requirements, the Contractor will provide to Unitywater a written undertaking from the product manufacturer how the conflict can be resolved and confirmation that the product will achieve the specified service life.

Unitywater reserves the right to approve deviations from the standards based on the product manufacturer's requirements.

Coating systems shall be those approved in the SEQ WS&S D&C Code, Infrastructure Products and Materials (IPAM) List.



## Pr9769 - Specification for Concrete Surface Protection

### Relevant Unitywater documents that relate to this specification

Document No.	Title
Pr9693	Unitywater Specification - Specification for Mechanical Installations

### International and Australian Standards

Standard	Title
Quality Systems	
AS 2990	Quality Systems for Engineering and Construction Projects
AS 3901	Quality Systems for Design/Development, Production, Installation and Servicing
AS 3902	Quality Systems for Production and Installation
AS 3903	Quality Systems for Final Inspection and Test
Materials and Workmanship	
AS 1318	SAA Industrial Safety Colour Code
AS 1345	Identification of the contents of pipes, conduits, and ducts
AS 1580.108.1	Paints and related materials – Methods of test – Determination of dry film thickness on metallic substrates – Non-destructive methods
AS 1580.408.2	Paints and related materials – Methods of test – Adhesion – Knife test
AS 1580.408.4	Paints and related materials – Methods of test – Adhesion (crosscut)
AS 1627	Metal finishing – preparation and pre-treatment of surfaces
AS 1627.1	Metal finishing – Preparation and pre-treatment of surfaces – Removal of oil, grease, and related contaminants
AS 1627.4	Metal finishing – Preparation and pre-treatment of surfaces. Part 4: Abrasive blast cleaning of steel
AS 1627.9	Metal finishing – Preparation and pre-treatment of surfaces
AS 1940	The storage and handling of flammable and combustible liquids
AS/NZS 2312	Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings
AS 2700	Colour standards for general purposes
AS 2855	Paints and related materials - Micaceous Iron Oxide pigments
AS/NZS 3894	Site testing of protective coatings
AS/NZS ISO 9001	Quality management systems - Requirements
ISO 8501	Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness
ISO 8502	Preparation of steel substrates before application of paints and related products – Tests for the assessment of surface cleanliness
ISO 8503	Preparation of steel substrates before application of paints and related products – Surface roughness characteristics of blast-cleaned steel substrates
ISO 8504	Preparation of steel substrates before application of paints and related products – Surface preparation methods
ISO 9001	Quality Management Systems requirements



## Pr9769 - Specification for Concrete Surface Protection

Standard	Title
NACE SP0188	Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates (Previously NACE RP0188)
SSPC-SP WJ2 NACE-WJ2	Joint Surface Preparation Standard Water Jet Cleaning of Metals (Very Thorough Cleaning)
SSPC-Paint 20	Steel Structures Painting Council (SSPC) – Zinc-Rich Coating Type II: Organic
SSPC-SP1	Steel Structures Painting Council (SSPC) – Solvent cleaning
SSPC-SP10	Steel Structures Painting Council (SSPC) – Near-white blast cleaning
SSPC Vis 1	Steel Structures Painting Council (SSPC) – Visual standard for abrasive blast cleaned steel