



Engineering

Technical Standard

TS 0711.2 – Concrete Remedial Works: Joint Sealant Replacement

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Significant/Major Changes Incorporated in This Edition

This is the first issue of this Standard. However, it supersedes the following SA Water documents:

- SAW-ENG-STR-TEM-TSB-006 Technical Specification - Sealing of Joints in Concrete Structures
- TS137 – Rehabilitation of Concrete Wastewater Manholes

Document Controls

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1 Introduction

1.1 Purpose

The purpose of this section of the Concrete Remedial Works Technical Standard is to detail SA Water's minimum technical requirements for the supply of materials, surface preparation, material application, inspection and testing for replacement of joint sealant for reinforced concrete water and wastewater assets.

It is intended that repairs completed in accordance with this Technical Standard are of consistent high quality and attain the specified durability and service life.

1.2 Concrete Remedial Works Technical Standard Suite

This Technical Standard is one part of the SAWS-ENG-TS 0711 Concrete Remedial Works Technical Standard suite that comprises:

- TS 0711.0: General requirements
- TS 0711.1: Concrete repairs (structural and non-structural repairs)
- **TS 0711.2: Joint sealant replacement (This Document)**
- TS 0711.3: Concrete crack repair
- TS 0711.4: Structural bonding and strengthening
- TS 0711.5: Surface protection and lining of concrete

Read TS 0711.2 in conjunction with TS 0711.0: General Requirements.

1.3 General Requirements

TS 0711.0 General Requirements apply to all aspects of the work:

1. Introduction: Purpose, references
2. Scope: Type of structures and repair methods, exclusions and technical dispensation
3. Using the technical standard
4. General project requirements
5. Quality requirements
6. Health and safety requirements
7. Environmental requirements
8. Construction Requirements

Appendix A : Schedules of hold points, witness points and identified records.

1.4 Joint Sealant Replacement Requirements

Carry out all remediation of concrete in accordance with the requirements as specified in TS 0711.0, the project contract documents, the requirements specified in this Technical Standard and the repair material manufacturer's instructions.

Request written advice from SA Water's Representative to resolve any conflict between this Technical Standard and any manufacturer's instructions.

Make no deviation from this Technical Standard without written approval from SA Water's Representative.

The technical requirements of this Technical Standard include:

1. Type of sealant materials
2. Pre-work survey to identify, mark out and record the location of defective joints
3. Trial repair to verify materials and workmanship
4. Removal of defective joint sealant and associated materials to provide a sound substrate
5. Where required, removal of all damaged/delaminated concrete along the joint
6. Preparation and priming of the concrete substrate
7. Reinstatement of sealant using materials suited to the exposure environment
8. Quality control testing to confirm compliance with this Technical Standard
9. Submission of an As-Repaired report.

Undertake additional remedial works if required (concrete repairs, crack injection, surface protection, structural bonding or strengthening) in accordance with TS 0711.1 to TS 0711.5.

1.5 Abbreviations

Abbreviations used in this document are defined in TS 0711.0 Clause 1.2.

1.6 References

Australian and International Standards, SA Water Standards, Industry Technical Guidelines and other documents referenced in this Technical Standard are defined in TS 0711.0 Clause 1.3.

1.7 Definitions

The terminology and technical definitions applicable to this Technical Standard are defined in TS 0711.0 Clause 1.4.

A selection of key technical terms relevant to this Technical Standard are defined in Table 1.

Table 1: Definitions of Terms Used in this Technical Standard.

Term	Definition
Elastomeric sealant	Elastomer for sealing gaps comprising a macromolecular material that rapidly regains its approximate original dimensions after the release of a weak stress that has caused its substantial deformation.
Joint gap	Joint width at sealant location irrespective of the width of the joint below or above the sealant.
Movement capability	Cyclic strain of a magnitude that can be accommodated by a sealant without damage where tested according to ASTM C719 with cement mortar substrate.
Non-sag sealant	Sealant that does not flow in vertical or inverted joints when applied at a temperature between 5°C and 50°C.
Sealant joint width	Sealant joint width calculated in accordance with ASTM C1472.
Self-levelling sealant	Sealant that flows sufficiently under gravity at a temperature not less than 5°C to become level when applied in a horizontal joint or to become smooth when applied to a joint on a cross fall.

2 Sealant Repair System Selection

This Technical Standard provides requirements for reinstatement of concrete joint sealants as part of concrete repair works, which might include one or more combinations of concrete repair type as listed in TS 0711.1 Table 2.

The type of replacement sealant required depends on the type of asset and the exposure environment as listed in Table 2 for horizontal and vertical joints in concrete and masonry elements and fall into the following general categories:

- General/ non-Trafficable
- General/ Trafficable
- Water retaining/Immersion service
- Chemical resistant.

Select the most onerous set of exposure conditions to determine the required sealant repair system considering its chemical and mechanical properties, joint geometry and operational requirements.

Table 2: Joint Sealant Materials

Exposure	Application	Sealant Type	Typical Use	Concrete Repair type*
Chemical Resistant	Resistant to aggressive chemicals, acids, alkalis, chlorine, immersion service	Silicone	Water and Sewage processing Tanks Chemical Bunds	2A, 2B, 5A, 5B
Bio Resistant	Wastewater biological, immersion service	Silicone Polyurethane	Wastewater treatment tanks and pipes	2B, 5B
Immersion/Potable Water	Immersion, potable water AS/NZS 4020 certified	Silicone Polyurethane	Potable Water storage tanks	2A, 5A
General External/Trafficable	High Movement, abrasion/UV/weather resistant	Silicone	External slabs	5C, 5D
General External/Trafficable	Low Movement, abrasion resistant	Polyurethane	Tank Floor slabs, pipe gaps,	5A
General Façade Paintable	UV & weather resistant, paintable	Polyurethane Silyl Modified Polymer	Precast concrete, lightweight cladding, brickwork	5A
Compatible with Bitumen	In contact bitumastic waterproof membranes	Bituminous mastic	Roof/wall membranes, drainage channels, retaining walls	5A
Fuel Resistant	Resists fuels	Polyurethane gun & pouring grade	Road pavement, slabs, car parks	5A
Fire	Fire rated joints in buildings or structures	Polyurethane	Seal around penetrations in buildings	5D

*As per Table 3 of TS 0711.1

3 Materials

3.1 General Requirements

Comply with general materials requirements detailed in TS 0711.0 Clause 8.4 and 8.5:

1. General
2. Repair systems
3. Proprietary items
4. Manufacturer's recommendations
5. Product Supplier
6. Compliance with AS/NZS 4020 (for drinking water applications)
7. Materials submissions
8. Storage of materials
9. Trials.

3.2 Approved Sealant Materials

Products not having prior documented SA Water approval shall not be used until approval has been obtained from SA Water's Representative.

HOLD POINT

3.3 Materials Testing

Undertake materials testing in accordance with TS 0711.0 Clause 5.9.

List all tests proposed to be undertaken to demonstrate compliance with the Technical Standard.

HOLD POINT

3.4 Joint Sealant Materials - Performance Requirements

Joint sealant materials shall achieve the following performance requirements, unless noted otherwise:

1. Be cold applied, elastomeric and rapid curing
2. Cure chemically through moisture activation and/or by the use of crosslinking agents or promoters
3. Sealants may be single or multi-component formulations
4. In horizontal joints be self-levelling or non-sag
5. In vertical joints be non-sag
6. In joints under traffic be capable of resisting punching from debris and particles accumulated over the joints
7. In joints in concrete to be overlaid by protective coatings be compatible with the coating system to be applied
8. If specified, the sealant colour after 21 days of curing shall be as shown on the Drawings unless otherwise accepted by SA Water's Representative
9. After installation and curing:
 - a. is not to pick up dirt
 - b. is to be watertight
 - c. is to accommodate the required movements over the required design life.
10. The sealant design life \geq 20 years, to be verified by the manufacturer for the intended purpose

Meet the key technical requirements for the type of sealants listed in

11. Table 3
12. The joint sealant primer shall be sealant, surface protective coating and exposure environment specific and be in accordance with the sealant Manufacturer's recommendation
13. Fire rated sealant shall comply with the requirements of AS 1530.4 and AS 4072.1 and provide a four-hour fire rating.

Table 3: General Performance Requirements

Property	Test Method	General/ Non-Trafficable	General/Trafficable	Water Retaining	Chemical Resistant
Drinking Water	AS/NZS 4020	-	-	Required	-
Resistant to bio-degradation	Track record	-	-	Required	Required
Resistant to dilute acids and alkalis	-	-	-	Required	Required
Resistant to strong chemicals	-	-	-	-	Required
Shore A hardness	ASTM C661 ISO 868	15 to 30	25 to 40	25 to 40	25 to 40
Heat aging (% of original mass)	ACTM C1246	≤7%, no cracking, no chalking after aging for 6 weeks at 70°C			
Minimum movement capacity	ASTM C719 ISO 9047	+100%, -50%	+25%, -25%	+25%, -25%	+25%, -25%
Tensile modulus at 100% strain	ASTM D412 ISO 8339	<0.4 MPa	<0.6 MPa	<0.6 MPa	<0.6 MPa
Effect of continuous immersion	ASTM C1247	-	-	≤9.5 cm ² for standard mortar substrate after 10 weeks exposure	
Flow (for self-levelling sealants only)	ASTM C639	Smooth level surface			
Non-sagging	ASTM C639	Vertical displacement: ≤4.8 mm Horizontal displacement: 0 mm			
Tack-free time	ASTM C679	≤4 hours, film pulls off with no sealant adhering to it			
Extrusion rate	ASTM C1183	≥10 mL/minute 3 hours after mixing			
Adhesion-in-peel	ASTM C794	Average peel force ≥ 30 N for standard mortar substrate when tested at an age of one day			
Adhesion/cohesion and movement capability	ASTM C719 ISO 9047	No debonding at substrate and no sealant failure. Test movement to be equal to the movement capability nominated by the manufacturer			
Durability (accelerated weathering)	ASTM C793	No cracks after UV exposure and bend test			

Provide manufacturer's documented evidence including copies of original test certificates that demonstrate that as a minimum the product exceeds each of the minimum performance requirements.

HOLD POINT

3.5 Water

Use potable quality water, drawn from the metropolitan reticulated supply, conforming to AS 1379 for cleaning and surface preparation.

4 Workmanship -General

4.1 Standards and Codes

Comply with the standards, codes and guidelines referenced in this document and as defined in TS 0711.0: Clause 1.3.

4.2 Concrete Repair Constructor Competency

Comply with all parts of TS 0711.0: Clause 4.1.

4.3 Quality Assurance

Comply with all parts of TS 0711.0: Clause 5 Quality and the quality control testing requirements in Clause 6.

Provide identified records listed in Appendix A.

4.3.1 Quality Control Inspector

At the discretion of the SA Water's representative, and subject to the project size and complexity, an approved Independent Quality Control Inspector shall be appointed for the works.

Nominate the inspector to SA Water's Representative prior to commencement of work.

The inspector shall hold a current coating inspection certificate from the Society for Protective Coatings (SSPC) or equivalent, with a minimum of 5 years of experience in application and testing of construction joint sealants or the sealant Manufacturer's representative:

1. For joint sealants in concrete in extreme and immersion exposure class conditions, the coating inspector shall hold a SSPC CCI Level 2
2. For all other joint sealants applied to concrete the coating inspector will hold SSPC CCI Level 1.

All work may be subject to partial or full inspection by SA Water's Representative or his representative.

The Constructor is not relieved of his own Quality Assurance/Quality Control and sealant system performance responsibilities.

4.3.2 Hold and Witness Points

Comply with all mandatory quality control and audit hold and witness points, listed in Appendix A.

Advise SA Water's Representative when hold points are reached and ready for inspection.

4.3.3 Inspection and Test Plans

Comply with ITP requirements in TS 0711.0 Clause 5.6.

Show the type, sequence and number of tests to be undertaken in each area and how the pass, rework or reject criteria will be determined on the ITP.

4.3.4 Pre-Start Meeting

Hold a pre-start meeting in accordance with TS 0711.0 Clause 8.6.

4.3.5 Daily Records

Comply with requirements in TS 0711.0 Clause 5.11 Site Records.

Maintain records of the work on a daily basis to enable traceability of workmanship and materials.

4.3.6 As-Repaired Report

Provide an As-Repaired Report in accordance with TS 0711.0 Clause 5.12.

4.4 Health and Safety Requirements

Comply with health and safety requirements in TS 0711.0 Clause 6:

- Clause 6.1 General
- Clause 6.2 Works on existing sewers
- Clause 6.3 Lighting
- Clause 6.4 Concrete removal
- Clause 6.5 Diving
- Clause 6.6 Traffic management
- Clause 6.7 Barriers and signs
- Clause 6.8 Equipment
- Clause 6.9 Hazardous materials.

4.5 Environmental Requirements

Comply with health and safety requirements in TS 0711.0 Clause 7:

- Clause 7.1 Noise emissions
- Clause 7.2 Compressor silencing
- Clause 7.3 Hand tools
- Clause 7.4 Waste management/Disposal of contaminants
- Clause 7.5 General cleaning and disposal of refuse
- Clause 7.6 Dust and water
- Clause 7.7 Existing flora.

4.6 Construction Requirements

Comply with the construction requirements in TS 0711.0 Clause 8:

- Clause 8.1 Existing structures
- Clause 8.2 Temporary works
- Clause 8.3 Extent of works identification
- Clause 8.4 Materials requirements
- Clause 8.5 Trials
- Clause 8.6 Pre-start meeting
- Clause 8.7 Commissioning and water quality monitoring.

4.7 Temporary Works

Provide temporary works including propping, access systems and plant isolations in accordance with TS 0711.0 Clause 8.2.

4.8 Pre-Work Survey

Undertake the pre-work survey requirements of TS 0711.0 Clause 8:

1. Clause 8.1.1: Verify existing structures and the location of all services located outside or embedded within the concrete structure components
2. Clause 8.3: Extent of works identification:
 - a. Mark up plan showing extent of work
 - b. Undertake and record pre-repair survey, submit Report
 - c. Undertake further testing if required
 - d. Mark out on the structure all defect areas for repair.

HOLD POINT

4.9 Materials Handling

Do not use sealant materials greater than 12 months age from the date of manufacture.

Store primer and sealant under conditions as recommended by the Manufacturer in a cool dry place out of direct sunlight.

If not a single component material, allow stored materials to attain a suitable temperature and add the material components and thoroughly mix prior to use, in accordance with the Manufacturer's recommendations and the approved Work Method Statement, using a slow speed drill to achieve a uniform consistency, colour and workability appropriate to the method of placing and minimising air entrapment.

Transfer mixed material to the application equipment.

Take precautions to avoid damage to any surface near the work zone due to mixing and handling of the material.

Properly dispose of empty containers in accordance with TS 0711.0 Clause 7.4.

WITNESS POINT

4.10 Trials

Undertake trial repairs to verify workmanship for all types of specified repair in accordance with TS 0711.0 Clause 8.5

HOLD POINT

Trial locations shall be as agreed with, or instructed by, SA Water's Representative.

4.10.1 Joint Sealant Trial

The joint sealant trial shall be a minimum of 1.0 lineal meter or as directed by SA Water's Representative and the entire trial repair process shall be observed by SA Water's Representative.

As a minimum demonstrate compliance for the following repair steps:

1. Substrate preparation
2. Delivery/application of the joint sealing material
3. Compliance with the relevant inspection and testing requirements.

4.10.2 Operative Competency Trial

Undertake competency of application trial panels for all concrete crack repair operatives in accordance with Clause 0.

5 Joint Sealant Application Workmanship

5.1 Removal of Defective Sealant

Remove all defective joint sealant and associated materials and all concrete delamination at a joint to be repaired. Take care not to damage the adjacent concrete surfaces or existing PVC waterstops.

HOLD POINT

Where required, propose removal and repair of adjacent delaminated/spalled concrete in accordance with TS 0711.1 for SA Water's Representative approval.

Note: Some old sealants may contain asbestos. Identify, remove and dispose of all asbestos containing materials in accordance with TS 0711.0 Clause 6.9.

5.2 Concrete Surface Preparation

5.2.1 General

Remove all laitance, aged sealants, loose materials and any contaminating foreign matter from joint faces back to sound substrate.

Ensure that the method of preparation does not cause weakness of the joint surface due to fracture or loosening of aggregate.

Where required, form a fresh joint surface by saw cutting or refacing with a suitable epoxy mortar.

Where required, undertake concrete repair to both sides of a joint in accordance with TS 0711.1 as approved by SA Water's Representative prior to application of sealant.

In trafficable locations, form a recessed butt joint profile to protect the sealant from mechanical damage. Provide a 5-10 mm, 45 degree chamfer at the surface level.

WITNESS POINT

5.2.2 Joint Profile

Prepare the joint to achieve a profile in accordance with the sealant Manufacturer's recommendations.

Provide the sealant a minimum 12 mm depth of bond surface to ensure adequate adhesion.

In applications where the sealant is subject to a hydrostatic pressure or traffic provide the sealant a minimum 20 mm depth of bond surface. NOTE: This requires the width of the joint to be a minimum of 20 mm wide.

Propose the joint profile based on site measurement of existing joints for SA Water's Representative approval.

The joint profile shall comply with the sealant Manufacturer's requirements.

Apply the sealant in a minimum 1:1 and maximum 3:1 width: depth ratio.

Unless otherwise specified by the sealant Manufacturer, the sealant is to have a 2:1 width: depth ratio.

HOLD POINT

5.2.3 Concrete Moisture Level

Allow sufficient time for all concrete repairs to cure, nominally a minimum 28 days for new concrete or as specified by the sealant Manufacturer if the sealant is part of its concrete repair system.

Before applying the joint sealant system, test the degree of concrete residual moisture in accordance with Clause 0 and ensure that the acceptance criteria in Clause 6.3.2 and the sealant Manufacturer's specified substrate moisture limit values are complied with.

Conduct this test after application of any cementitious rendering material.

Take due attention of moisture content along the joint edges due to, for example, dew fall.

HOLD POINT

5.2.4 Cleaning

Use solvents to clean all joint surfaces immediately prior to application of a primer (where recommended by the sealant Manufacturer) or the sealant.

Solvent clean using two-cloths: cleaning the substrate with a solvent-saturated cloth and dry the solvent-wet surface with a separate clean, dry cloth.

Replace used and dirty cloths frequently.

Use a water-soluble solvent, such as isopropyl alcohol (IPA) or Methyl Ethyl Ketone (MEK).

The prepared joint surfaces are to be clean, dust free and dry prior to application of a primer/sealant.

5.3 Integration with Surface Protective Coatings

Where required, install the specified protective coating system without the topcoat before reinstating the sealant.

Apply the protective coating system in accordance with TS 0711.5: Surface Protection and Lining of Concrete.

Extend the concrete coating system inside the joint to a minimum of 5 mm beyond the nominated depth of the sealant.

5.4 Sealant Application

5.4.1 Environmental Requirements

Pay due attention to sealant pot life and recommended placing temperatures. Avoid extremes of temperature at the time of placement, exposure to direct sunlight and strong winds.

Do not place sealant if the ambient or substrate temperatures lie outside the range 5°C to 35°C.

Adequately protect the sealant against weather and physical damage during the curing period of the sealant.

Where required, use any protective boards/plates plus any other curing measures recommended by the Manufacturer.

5.4.2 Priming

Apply a primer to the bonding faces of the joint unless not recommended by the sealant Manufacturer.

Mix the primer material components together using a drill and paddle mixer or in accordance with the sealant manufacturers recommendations for the manufacturers required time period.

Apply an even coat of the primer immediately after joint preparation and cleaning is complete, subject to the ambient and substrate temperature and dew point meeting the manufacturer's requirements, and the primer's pot life at the ambient temperature.

Where the joint is lined with an approved protective coating seek recommendations from the sealant manufacturer as to its compatibility with the protective coating and priming requirements.

Take due care to allow the primer to be touch dry prior to insertion of the backing rod in accordance with the sealant Manufacturer's recommendations.

Protect the base of the joint from contamination by the primer.

Do not apply primer to the base of the joint.

Protect primed surfaces from dust and contamination prior to application of the sealant. Re-clean and reprime any surfaces that become contaminated,

Use protective tape or other means approved by SA Water's Representative to protect any exposed concrete or painted surfaces adjacent to the joint.

Apply the protective tape (or other approved means) immediately before sealant application and remove it immediately after sealant application.

WITNESS POINT

5.4.3 Backing Material

Once the required profile and all surface preparation works are completed, install:

1. Formed joints – a bond breaker tape in accordance with the sealant Manufacturer's recommendations. Typical bond breaker materials are polyethylene, teflon or masking tape
2. Un-formed joints – a closed-cell backing rod with a minimum adhesion to the sealant. Compress the backing rod into the joint. Unless otherwise recommended by the sealant Manufacturer, the diameter of the backing rod shall be 25-30% larger than width of the joint.

Where required, trim the existing joint infill board to allow for accommodation of the backing rod.

Fix the backing rod in its correct position, using purpose-made hand tools (double-wheeled roller), to ensure the required geometry of the sealant is achieved.

Do not puncture or damage the backing rod in any way during installation.

WITNESS POINT

5.4.4 Sealant Application

Apply the sealant within the maximum period specified by the Manufacturer after cleaning and primer application. This should be no greater than 8 hours at normal temperatures and 3 hours above 30°C. Abrade, clean and reprime any primed areas that are not sealed within these time limits.

Do not apply sealant to tacky or wet primer.

The correctly primed surface should appear shiny or as recommended by the sealant manufacturer. If it is not shiny, reapply the primer.

Apply and build up the sealant firmly and uniformly to the design profile using suitable tools and minimising voids.

Suitably compact the sealant by tooling, forcing the sealant into the back and sides of the joint thus achieving the desired sealant profile without dragging, tearing or leaving unfilled spaces.

When the joint has been filled with the required amount of material, tool it into a regular cross section profile of the required dimensions (using a small spatula or other suitable tool) to ensure optimum contact with the joint faces and to remove any trapped air or voids.

Unless otherwise instructed by SA Water's Representative, finish the sealant to a concave joint recess.

Immediately clean up equipment and uncured sealant.

WITNESS POINT

5.5 Inspection and testing

Undertake inspection and testing in accordance with Clause 6.

5.6 Non-Compliant Work

If non-compliant work is identified, stop work to verify the cause of failure. Once the cause of failure is identified, undertake corrective measures approved by SA Water or SA Water's Representative.

Identify by additional testing the portion of the works yielding unsatisfactory results (e.g. area of a floor/wall, works completed on a particular day or by a particular crew; or using a particular batch of materials).

Unless otherwise approved by SA Water's Representative, the entire portion of the works yielding unsatisfactory results or is otherwise non-compliant with this Technical Standard is to be removed and replaced in accordance with this Technical Standard.

6 Quality Control Testing

6.1 General

Comply with all Quality Control Testing requirements in TS 0711.0 Clause 5 and this Technical Standard.

Use qualified and experienced inspectors to conduct all testing and quality control activities as required by this Technical Standard and the ITPs as the works proceed.

Allow for all samples, their production, retrieval and storage, testing and reporting required by the Contract.

Provide access, undertake sampling by coring (if requested by SA Water's Representative) and make good to reinstate to the profile of the surrounding surfaces using the approved repair materials and workmanship for any tests.

SA Water's Representative is at liberty to witness the carrying out of any test performed by the Constructor or its representative. The Constructor will be given one copy of any test result or report upon request.

SA Water or SA Water's Representative may carry out additional testing to non-compliant designated areas.

Where testing is to be performed by a laboratory, supply one (1) copy of the laboratory report.

WITNESS POINT

6.2 Applied Joint Sealant - Quality Control Tests

The minimum testing requirements are listed in Table 4 as appropriate to the shape of the element and the test details follow.

Additional testing may be included in the submitted ITP.

Table 4: Joint Sealant Quality Control Tests and Frequency

Test Required	Performed By	Procedure	Minimum Frequency of Testing
Concrete Moisture Level	QC Engineer	Clause 0	One test per 30 m of sealant
Visual Inspection of Sealant	QC Engineer	Clause 6.4	All sealed joints
Sealant Adhesion	QC Engineer	Clause 0	One test for the first 30 m of sealant, then one per 200 m sealant provided each test is successful, otherwise every 30 m of sealant.

6.3 Test Method - Concrete Moisture Level

6.3.1 Method

Use ASTM D 4263 (Plastic sheet method) to determine if the concrete is sufficiently dry to apply the coating primer.

Test at the rate of every 50 m² of coated concrete surface or one test per 30 m of sealant, with a minimum of one test for each 10 m of vertical rise commencing within 300 mm of the floor.

Conduct the test after the application of any cementitious rendering material.

If required by SA Waters Representative, assess the concrete internal moisture content to ASTM F 1869 Measuring MVER of Concrete using Calcium Chloride or ASTM F 2170 Determining RH in concrete floor slabs using in situ probes.

6.3.2 Acceptance Criteria

ASTM D 4263: Dry no evidence of a damp/wet surface under the plastic sheet

ASTM F 1869: Maximum result of 15 g/24 hr/m²

ASTM F 2170: Maximum in situ relative humidity result of 80% or as otherwise specified by the coating Manufacturer.

Note: These limits apply in the absence of the coating Manufacturer's limits.

6.4 Test Method - Visual Inspection of Sealed Joints

6.4.1 Method

Inspect the entire length of sealed joint following full curing of the sealant.

Assess the extent of joint filling visually.

6.4.2 Acceptance Criteria

The finished product is to be uniform in appearance and profile with no sagging, voids, pin holes, contamination or any other defects.

6.5 Test Method - Adhesion of Sealed Joints

6.5.1 Method

Undertake in-situ (field) adhesion testing in accordance with Method A in ASTM C1521 at the rate of one test for the first 30 m of sealant, then one test per 100 m sealant provided each test is successful, otherwise every 30 m of sealant, but not less than one per floor/wall section or one per week per crew, whichever is more frequent

Provide access, undertake testing and repair all test areas.

For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

Report whether sealant failed to adhere to joint substrates or tore cohesively.

Include data on pull distance used to test each kind of product and joint substrate.

Record all results in accordance with the approved Inspection and Testing Plan.

Repair the test area by re-applying new sealant to the area.

Use the application procedure given in section 5.4.

Ensure that the original sealant surfaces are clean and that the new sealant will be in contact with the original sealant, so that a good bond between the new and the old sealant is achieved.

6.5.2 Acceptance Criteria

Sealants not evidencing adhesive failure from testing, in absence of other indications of non-compliance with requirements, are to be considered satisfactory.

WITNESS POINT

Appendix A : Schedules of Hold Points, Witness Points and Identified Records

A1 Schedule of Hold Points: Workmanship

Clause	Type	Description
3.2	Hold	Approved sealant materials
3.3	Hold	Material testing
0	Hold	Performance Requirements
4.8	Hold	Pre-work survey
4.10	Hold	Trial Repair
5.1	Hold	Removal of defective joint sealant and associated materials.
5.2.2	Hold	Preparation of substrate and joint profile.
5.2.3	Hold	Testing of concrete moisture level

A2 Schedule of Witness Points: Workmanship

Clause	Type	Description
4.9	Witness	Disposal of containers
5.2.1	Witness	Concrete surface preparation
0, 5.4.3, 0	Witness	Installation of joint sealant and associated materials.
6	Witness	Inspection and testing.

A3 Schedule of Identified Records

Clause	Description of Identified Record
4.3	Constructor submission of Work Method Statement (WMS)
4.3	Constructor submission of Inspection and Test Plan (ITP).
4.10	Submission of Trial Repair Report, if trial repair is deemed necessary by SA Water.
4.8	Submission of areas for repair marked out by Constructor.
4.3	Submission of completed ITP.
4.3	Submission of the As-Repaired Report.

Appendix B : Example Inspection and Test Plan

B1 Joint Sealant Application

LEGEND: X = Responsible for; H = Hold Point; W = Witness Point

Task no.	Work Phase	Inspection and Testing Activities	Applicable Documents	Acceptance Criteria	Frequency	Verifying Document	Assessment /Test result Pass/Fail	Constructor (Sign/Date)	SAW (Sign/Date)
1	Prior to start of Works	Submission of WMS with Materials and ITP	TS 0711.2	SAW acceptance	Once	SAW acceptance		X	H
2	At the start of the Works	Submission of areas marked out for repair	TS 0711.2	SAW acceptance	Once	SAW acceptance		X	H
3	Each section of Works	Removal of defective sealant	TS 0711.2	SAW acceptance	For each section of Works	SAW acceptance		X	H
4	Each section of Works	Substrate preparation: Joint profile Cleanliness Moisture content	TS 0711.2	In accordance with sealant Manufacturer's requirements	For each section of Works	SAW acceptance		X	H
5	Each section of Works	Installation of joint sealant and associated materials	TS 0711.2	SAW acceptance	For each section of Works	SAW acceptance		X	W
6	Each section of Works	Visual inspection of finished product	TS 0711.2	SAW acceptance	For each section of Works	SAW acceptance		X	H
7	Each section of Works	In-situ adhesion testing	ASTM C1521	Adhesive or cohesive failure	1 test for 30 m of sealant. If satisfactory results for the first 300 m, 1 test for 100 m of sealant but not less than 1 per floor/wall section or 1 per week per crew whichever is more frequent.	SAW acceptance		X	H
8	At completion of the Works	Completed ITP	TS 0711.2	SAW acceptance	Once	SAW acceptance		X	H
9	At completion of the Works	As-Repaired report	TS 0711.2	SAW acceptance	Once	SAW acceptance		X	H