B15 Cementitious Patch Repair of Concrete
Date: July 2014
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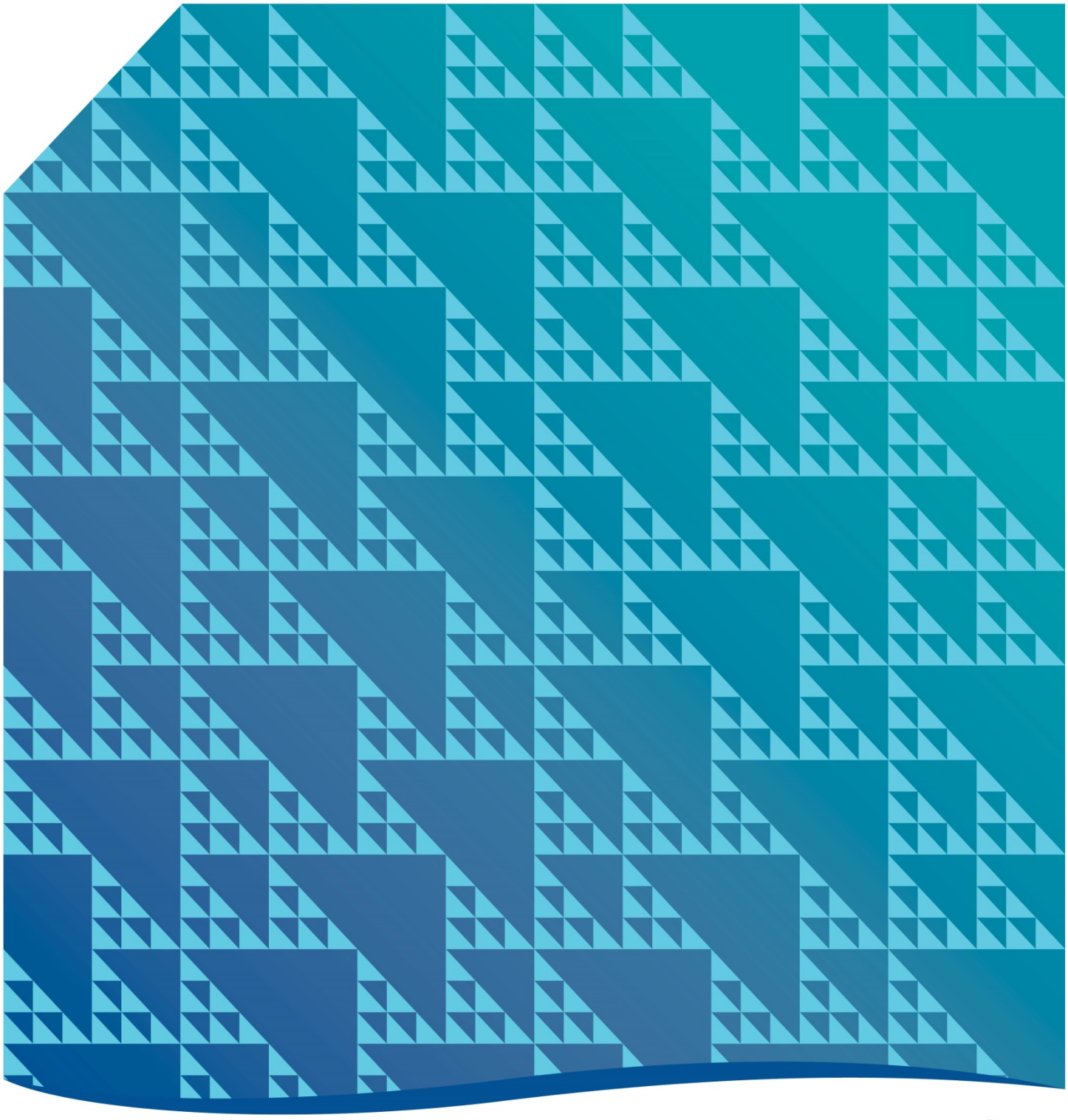
# Bridgeworks Specification



Department of State Growth

Tasmanian Government

## REVISION REGISTER

| Ed/Rev Number | Clause Number | Description of Revision | Authorised By | Date |
|---|---|---|---|---|
| Ed 1 / Rev 0 | All | *'Department of State Growth'* replaces *'DIER'* | VT (MBA) | 07.07.14 |
| | Title | Specification Title renamed from "*Concrete Repairs*" | | |
| | B15.1 | Clause reworded | | |
| | B15.2 | Wording added to clause | | |
| | B15.3-B15.5 | New clauses added | | |
| | B15.6 | Replaces previous B15.6 clause, clause reworded | | |
| | B15.7 | New clause added | | |
| | B15.8 | New clause, replaces previous B15.3, B15.4, B15.7, B15.10 & B15.11 clauses | | |
| | B15.9 | Replaces previous B15.5 clause, wording added to clause | | |
| | B15.10 | Replaces previous B15.9 clause, clause reworded | | |
| | B15.11-B15.12 | New clauses added | | |
| | B15.13 | Replaces previous B15.12 clause, wording added to clause | | |
| | B15.14 | New clause added | | |
| | B15.15 | Replaces previous B15.8 clause, concrete grade "S40" replaces "32S" and concrete grade "S50" replaces "50S" | | |
| | B15.16 | Replaces previous B15.13 clause, table removed from clause | | |
| | B15.17 | New clause added | | |

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## B15.1 SCOPE

This Specification sets out the requirements for the supply of materials, surface preparation, application, relevant inspection and testing and acceptance criteria for the patch repair of concrete structures using cementitious repair materials.

## B15.2 EXTENT OF WORKS

The area of repair shall be as detailed on the drawings, as specified elsewhere or as defined on site by the Superintendent.

Where damage results from carbonation of the cover concrete, the extent of repair shall be confirmed during preparation by the application of phenolphthalein solution to remove all carbonated concrete over the defined area of repair.

Where damage results from the delamination of cover concrete, the extent of repairs shall be confirmed after preparation of repair works to ensure that all delaminated cover concrete has been removed.

The Contractor shall determine whether temporary shoring or propping is required for any concrete repairs, and submit proposals to the Superintendent for approval.

Temporary works shall be designed and certified by a qualified engineer who must be a Chartered Professional Engineer member of Engineers Australia practicing in the relevant field or a Registered Structural Engineer (NPER or equivalent).

A copy of the Design Certificate shall be provided to the Superintendent prior to the commencement of the temporary works installation.

Patching may incorporate sacrificial ring anodes to counteract incipient corrosion at the direction of the Superintendent.

## B15.3 REFERENCES AND STANDARDS

Cementitious patch repair of concrete shall be compatible with the provisions of all Department of State Growth Standard Specifications, Austroads Guides & Test Methods and Australian Standards in particular:

*Department of State Growth Standard Specifications*

- G2 – Contract Management Plan
- B10 – Supply of Concrete
- B11 – Reinforced, Prestressed and Mass Concrete
- B16 – Repair of Concrete Cracks
- B23 – Penetrating Sealers and Coatings for Concrete
- B24 – Structural Protective Coatings
- R54 – Road and Bridge Cleaning

*Australian Standards*

- AS 1478 Chemical admixtures for concrete, mortar and grout
- AS 1627 Metal finishing – Preparation and pretreatment of surfaces
- AS 3610 Formwork for concrete
- AS 3799 Liquid membrane-forming curing compounds for concrete
- AS 4671 Steel reinforcing materials
- AS 5100.5 Bridge design – Concrete

*Other Relevant Standards*

- VicRoads Test Method RC 252.02 Determination of the Tensile Bond Strength of Concrete Repairs and Strengthening Systems
- BS 6319 Testing of resin and polymer/cement compositions for use in construction

## B15.4 DEFINITIONS

Further to the documents referred to in *Clause B15.3* the following definitions shall apply:

*Blowholes* – Small regular or irregular cavities, usually not exceeding 15 mm in diameter or 5 mm in depth, resulting from entrapment of air bubbles in the surface of formed concrete during placement and consolidation.

*Bond* – The adherence between the repair material and the existing concrete substrate.

*Bond strength (or pull-off strength)* – The resistance to separation of a repair material from the existing concrete substrate.

*Corrosion Deteriorated* Concrete – Concrete with deterioration, delamination, cracking or spalling due to contamination by deleterious substances such as chlorides and carbon dioxide associated with the overall mechanism of corrosion of steel reinforcement.

*Delamination* – The separation of a section of concrete from solid concrete usually along steel reinforcement which is identified by a drummy or hollow sound instead of a clear ringing sound when metal hits the concrete.

*Exposure Classifications* – In accordance *AS 5100.5, Table 4.3* and summarised as follows:

| | | | |
|---|---|---|---|
| A | Mild | C | Very Severe |
| B1 | Moderately Severe | U | Special Consideration |
| B2 | Severe | | |

*Fairing coat* – A thin layer of cementitious material used to render large surface areas and cover, fill or smooth blowholes and surface imperfections flush with the finished concrete surface.

*Featheredging* – Cementitious repair material applied to the edge of the repair in a very thin layer instead of a thicker layer which is contained at the edge with a square cut.

*Non-corrosion Deteriorated or Defective Concrete* – Concrete with deterioration, damage or defects due to accidental or physical loadings, temporary overloading, impact and other mechanical or uncontaminated damage, excessive early shrinkage or thermal stresses and low quality honeycombed or off form voided concrete.

*Surface Imperfections* – Surface voids or cavities not exceeding 5 mm in depth left on the concrete surface (in the form of surface honeycomb), due to failure of the mortar to effectively fill the spaces among coarse aggregate particles during placement and consolidation.

*Spall* – A fragment of concrete broken off or detached from the edge of solid concrete due to the corrosion of steel reinforcement or due to accidental, physical or mechanical damage.

## B15.5 TYPES AND SELECTION OF PATCH REPAIR METHODS

This section includes the following types of patch repair of concrete structures using cementitious repair materials:

- corrosion deteriorated concrete repair
- non-corrosion deteriorated concrete repair
- filling of blowholes and surface imperfections.

Repair of concrete shall include:

- breaking back to sound and dense concrete to receive repair material
- preparation of steel reinforcement and concrete substrate
- application of an appropriate steel primer and substrate bonding coat
- rebuilding to the original surface profile.

Prior to commencement of any patch repair of concrete, the Contractor shall assess the affected concrete structure or component to determine the influence of spalled, deteriorated, damaged or honeycombed concrete on load bearing capacity, serviceability and durability, and submit the assessment to the Superintendent for review.

A cementitious patch repair method shall be selected based on:

- an assessment of the cause(s) and extent of the spalled, deteriorated, damaged or defective concrete;
- the location of the patch repair on the concrete structure or component;
- the proposed repair material properties, likely patch behaviour and the effect on load capacity and structural safety, serviceability and durability and cathodic protection.

A patch repair method shall be submitted which includes requirements for surface preparation, method of application, curing and surface finish, to ensure the longevity of the repair solution.

Any underwater repairs methodology proposed by Contractor shall be submitted to the Superintendent for review and approval.

Any proposal to use patch repair methods and repair materials other than those specified in this section shall be submitted to the Superintendent for review.

The application of anti-graffiti and decorative/anti-carbonation coatings and crack repairs which may be required as part of the concrete repair work shall be undertaken in accordance with the requirements of *Standard Specifications B16 Repair of Concrete Cracks, B23 Penetrating Sealers and Coatings for Concrete and B24 Structural Protective Coatings*.

## B15.6 MATERIAL PROPERTIES

### *B15.6.1 General*

Materials used for reinstatement of concrete shall be single component polymer modified cementitious non-shrink repair mortars, or be part of a complete polymer modified cementitious repair system. Only whole bags of material shall be used. Test certificates, material data sheets and health and safety data sheets shall be available for all materials.

The use of the repair material is subject to approval by the Superintendent, and with the chosen materials shall be listed in the Contract Management Plan (CMP).

### *B15.6.2 Repair Material*

The proposed repair material shall:

(i) be capable of being hand applied in vertical and overhead sections up to 30 mm thick in one application with no slumping
(ii) achieve strength conforming to the requirements in *Table B15.1 – Repair Material Strength Requirements*
(iii) achieve a drying shrinkage of less than 600 microstrain at 28 days in accordance with ASTM prism at 23ºC and relative humidity of 50%
(iv) minimum wet density of 1700 kg/m3
(v) maximum water/powder ratio of 0.16
(vi) resistant to alkaline solutions.

Steel reinforcement primer and substrate-bonding coat shall be compatible with the repair mortar and be part of the same range of proprietary repair system.

***Table B15.1 – Repair Material Strength Requirements***

| Concrete Structure Strength | Repair Material Strength | | |
|---|---|---|---|
| | **@ 1 day** | **@ 7 days** | **@ 28 days** |
| **Minimum Compressive Strength** *(in accordance with BS 6319 Pt 2:1983 – dry cure)* | | | |
| 15 MPa to 30 MPa | 5 MPa | 19 MPa | 23 MPa |
| Greater than 30 MPa to 50 MPa | 10 MPa | 25 MPa | 35 MPa |
| Greater than 50 MPa | 15 MPa | 40 MPa | 60 MPa |
| **Minimum Flexural Strength** *(in accordance with BS 6319 Pt 3:1990)* | | | |
| 15 MPa to 30 MPa | | | 4 MPa |
| Greater than 30 MPa to 50 MPa | | | 6 MPa |
| Greater than 50 MPa | | | 10 MPa |
| **Minimum Tensile Strength** *(in accordance with BS 6319 Pt 7:1985)* | | | |
| 15 MPa to 30 MPa | | | 1.8 MPa |
| Greater than 30 MPa to 50 MPa | | | 2.8 MPa |
| Greater than 50 MPa | | | 3.8 MPa |
| **Minimum Bond Or Pull-off Strength to Concrete Substrate @ 7 days** *(in accordance with VicRoads Test Method RC 252.02)* | | | |
| All Concrete Structure Strengths | | 0.75 MPa | |

### *B15.6.3 Fairing Coat*

Fairing coat cementitious repair material required to fill blowholes and imperfections on concrete structures shall be:

(i) a single component polymer modified material
(ii) capable of application at 0 – 3 mm thick and fill blowholes and imperfections flush with the finished concrete surface
(iii) capable of application over a large area without being subject to shrinkage cracking.

## B15.7 HANDLING AND STORAGE OF MATERIALS

Repair materials shall be stored in accordance with the material manufacturer's requirements, including:

- in dry conditions not exposed to direct sunlight
- within the specified maximum and minimum temperature range
- in their original, sealed moisture resistant bags or containers.

All material shall be brought to site in the original sealed bags or unopened containers clearly labelled with the appropriate manufacturer's name, product type, reference number and batch number. Materials stored beyond the manufacturers recommended shelf life shall be discarded.

The following information shall be provided for each batch of repair material:

(a) manufacturer's name and address
(b) product reference
(c) batch number of identification
(d) certificate of date of manufacture.

## B15.8 PREPARATION AND APPLICATION

### *B15.8.1 General*

The Contractor shall perform concrete repair work in conformity with the manufacturer's specification.

Any deviations from the manufacturer's specification and the requirements of this specification shall be submitted to the Superintendent for review accompanied by certification from the manufacturer, prior to commencement of repairs.

### *B15.8.2 Steel Reinforcement*

If the structural capacity of the reinforcing is compromised by the extent of corrosion or pitting then the diameter of the reinforcement shall be measured after preparation and, as directed by the Superintendent, the reinforcement cut out and replaced, or additional bars added. Where bars are replaced, full strength butt welds, using backing plates are required.

Reinforcement damaged during preparation shall be repaired or replaced, as directed by the Superintendent. Reinforcement used in repairs shall comply with the requirements of *AS 4671*.

### *B15.8.3 Surface Preparation*

#### *B15.8.3.1 General*

For all types of patch repair all defective and delaminated concrete and existing repair materials shall be broken back to a sound and dense concrete surface. Defective concrete shall be removed using light hand held percussive equipment or high pressure water jetting, at a pressure not in excess of 140 MPa (20,000 psi) to avoid creating micro cracks. Before high pressure blasting, the perimeter of the areas to be repaired shall be cut to a depth of 10 mm. Care shall be taken to ensure that any steel reinforcement exposed or other embedments such as conduits or sockets is not cut or damaged. The method of breaking back or scabbling shall ensure that excess dust does not form a hazard in the surrounding area.

Hammer sounding shall be conducted on completion of breakout to ensure that all delamination has been removed. A perpendicular saw cut of at least 15 mm shall be provided around the perimeter of the area to be repaired to prevent featheredging of the repair material. The saw cut surface shall be roughened by removing the surface layer to expose small particles of well bound aggregate.

All concrete surfaces and mortar substrates shall be sound, clean and free from dust, oils, and grease and surface contaminants. All loose and unsound materials and surface laitance shall be removed.

The concrete substrate and any exposed steel reinforcement shall be cleaned by a final wash down or by blowing down with oil free compressed air to ensure removal of all residual contamination. The prepared concrete substrate shall be thoroughly pre-wetted with clean fresh water and shall be surface dry prior to application of repair material.

#### *B15.8.3.2 Corrosion Deteriorated Concrete Repair*

In addition to other requirements, for repair of corrosion deteriorated concrete repair all defective and delaminated concrete and existing repair materials shall be broken back to a sound and dense concrete surface to a minimum of 20 mm behind and around the rusted steel reinforcement.

Concrete shall be removed along the length of visibly corroding steel reinforcement until at least 50 mm of sound, rust free metal is exposed at each end of the rusted section.

All corrosion products shall be removed from the exposed steel reinforcement. Steel reinforcement shall be cleaned to a bright metal to achieve a surface preparation equivalent to *AS 1627.4* Class 2.5.

#### *B15.8.3.3 Non-corrosion Deteriorated or Defective Concrete Repair*

Where concrete has been damaged by impact, the minimum depth of preparation shall be 40 mm.

The Superintendent shall review the depth of removal of concrete for non-corrosion deteriorated or defective concrete repair and the amount of exposure of steel reinforcement prior to commencement of application of repair material.

#### *B15.8.3.4 Sacrificial Anodes*

Where specified in the contract documents or where required by the Superintendent, embedded sacrificial anodes (ESAs) shall be installed on the perimeter of the repair in accordance with the repair design and the manufacturer's instructions.

ESAs shall be fixed to the reinforcement prior to priming to ensure electrical connectivity. Ensure that the surfaces to be in contact with the ESAs are clean before installing.

### *B15.8.4 Application of Reinforcement Protection and Substrate-Bonding Coat*

All exposed steel reinforcement shall be coated immediately following preparation and cleaning with a primer which forms part of the proprietary repair system to provide immediate protection against corrosion. The steel primer shall be adequately applied to the back of the steel reinforcement where it is fully exposed and where steel bars are tied together. Over-coating of the concrete substrate with the steel primer shall be avoided unless it is a requirement of the overall repair system.

A substrate-bonding coat which also forms part of the proprietary repair system shall be worked into the concrete substrate using a short bristle brush to enhance the bond at the repair interface.

The reinforcement protection and substrate bonding product shall be approved by the Superintendent.

### *B15.8.5 Application of Repair Mortar*

The Contractor shall include within its quality procedures the manufacturer's specifications for use of the repair materials, and test plans that meet the requirements of the standards and this section. The repair product shall be approved by the Superintendent prior to any application on site.

Reinstatement of prepared areas shall not commence until:

(i) a joint measurement of the repair area by the Superintendent and the Contractor has taken place
(ii) evidence that the preparation of the repair area conforms to the requirements of this Specification
(iii) the Contractor's quality procedures has been sighted and approved by the Superintendent.

All materials shall be applied in accordance with the manufacturer's specifications or instructions for use in a continuous process.

The repair mortar shall be thoroughly mixed in whole bags with potable water measured with graduated measuring equipment prior to commencement of application. Mixing of repair materials shall be undertaken in a forced action mixer or in a suitably sized drum using a spiral paddle fitted to a low speed heavy-duty drill. Free-fall mixers shall not be used.

Retempering, remixing and the addition of water to restore the workability of the repair material shall not be permitted, and any unsuitable material shall be rejected. Repair material shall be applied while the substrate bonding coat is still tacky.

Concrete shall be rebuilt to the original surface profile using a cementitious repair material. Repair material shall be applied taking particular care to pack behind and between reinforcement. Where the existing concrete cover to the steel reinforcement is less than the design requirements, the new repair shall be profiled as required to ensure that a minimum cover of polymer modified repair material to the steel reinforcement is achieved as specified in *Clause B15.8.2*.

Repair material shall only be applied when the concrete substrate temperature and the air temperature measured at the point of application is above 5°C or 5°C and rising. No material shall be applied when the air temperature measured at the point of application is above 35°C.

Where the ambient temperature at the point of application of material is above 30°C and the area to be treated is subject to direct sunlight, protective shading shall be used and equipment that comes into direct contact with the repair material shall be kept cool and not exposed to direct sunlight.

If sagging occurs, the material must be completely removed and the void filled by two or more successive layers, or by providing formwork.

### *B15.8.6 Blowholes and Surface Imperfections*

Blowholes and surface imperfections shall be filled with a scrape coat application of a single component cementitious fairing coat repair mortar.

A fairing coating shall be applied when required by this Specification for architectural reasons, or to provide protection against further carbonation or chloride ingress.

The extent of application shall be as specified or as directed by the Superintendent.

All surfaces shall be free of oil, grease, loose particles, decayed matter, moss or algal growth, curing compounds, laitance and surface contamination. Cleaning shall be in accordance with *Standard Specification R54 Road and Bridge Cleaning*.

Treatment, including wetting, priming, mixing, application and curing, shall be in accordance with the manufacturer's instructions.

A cementitious fairing coat repair mortar may also be used in a thin layer where a uniform concrete surface is required prior to the application of a protective or decorative coating in accordance with *Standard Specification B23 Penetrating Sealers and Coatings for Concrete* to protect concrete against carbonation and chloride ingress.

The quality control testing requirements of *Clause B15.13.1* shall not apply to cementitious fairing coat repair mortars.

## B15.9 FORMWORK

Where required, formwork shall be provided in accordance with *AS 3610*.

Formwork shall be securely fixed to withstand the hydraulic pressures of the repair material.

Fixing of the formwork shall not compromise the durability of the structure.

Facing of the formwork shall be selected so that the finish of the repaired area matches that of the surrounding concrete. Where formwork is used to facilitate the patch repair, it shall be pre-treated such that it prevents moisture absorption from the repair mortar and positioned such that it does not inhibit effective compaction of the repair material.

An appropriate release agent shall be applied to the formwork.

Where repair material is introduced into the repair by hydrostatic pressure or pumping, the entry point for the feed point shall be at the lowest point of the formwork. Where necessary, provision shall be made for controllable inspection ports to prevent air entrapment and to enable the extent of flow of the repair material to be assessed.

## B15.10 CURING AND PROTECTION

Immediately after placement and for seven days thereafter, the repair material shall be cured and protected from drying out and against the harmful effects of water movement and weather, including rain and rapid temperature changes.

Cementitious material shall be cured with a curing compound in accordance with the material manufacturer's specification. In addition to a curing compound, heavy duty polyethylene sheeting fastened and sealed at the edges shall also be provided for concrete patch repairs greater than 500 mm x 500 mm in size and for all concrete repairs to chloride affected concrete structures or components.

Curing compounds shall comply with *AS 3799*. Curing compounds shall be removed prior to the application of any protective or decorative coatings, unless documented evidence is provided to the satisfaction of the Superintendent that the applied curing compound is compatible with any proposed coatings.

## B15.11 FINISHING AND SURFACE CONDITION

All surfaces shall match surrounding surface finish by use of steel forms or steel trowel finish. The surface of the concrete repair shall not have cracks of width greater than 0.10 mm measured at the concrete surface nor craze cracking covering a significant area of the repair at the completion of the curing period.

Cracks in repair material shall be repaired in accordance with *Standard Specification B16 Repair of Concrete Cracks*.

There shall be no cracking at the interface of the concrete repair with the existing concrete.

A joint inspection of all concrete repaired areas with the Contractor and Superintendent shall be undertaken 12 months after completion of the repair works, or prior to the end of the defects liability period (whichever is earlier).

The surface of the concrete repair shall not have cracks of width greater than 0.10 mm measured at the concrete surface nor craze cracking covering a significant area of the repair 12 months after completion of the repair works, or at the end of the defects liability period (whichever is earlier).

Any necessary remedial works shall be undertaken within two weeks of the date of inspection.

## B15.12 TOLERANCES

The tolerance on edges and surfaces in plan and level shall be ± 3 mm.

Maximum allowance for irregularities when measured with a 2.0 metre straightedge shall be 3 mm. In addition, evenness shall not deviate by more than 1 mm when checked with a 300 mm straightedge.

## B15.13 QUALITY CONTROL

### *B15.13.1 Testing*

#### *B15.13.1.1 Compressive Strength of Cementitious Repair Material*

Three 75 mm test cubes shall be taken from the first batch of material mixed, then three 75 mm cubes for every 100 kg of material used thereafter to test for compressive strength. The cubes shall be cured for 7 days under laboratory-controlled conditions. Two cubes shall be tested at 7 days and the third cube at 28 days to confirm compliance with the minimum compressive strength requirements as specified in *Table B15.1 – Repair Material Strength Requirements*. Test cubes shall be made, cured and tested in accordance with *AS 1478.2*.

#### *B15.13.1.2 Bond Strength (Pull-Off) Testing*

The Contractor shall conduct partially cored direct pull-off tests of the fully cured in situ repair material to verify the tensile bond strength between the in situ repair material and the existing concrete substrate, 7 days after the completion of application. The pull-off testing shall be undertaken in accordance with *VicRoads Test Method RC 252.02*.

The test locations shall be jointly determined by the Contractor and the Superintendent.

Testing shall be carried out at a frequency of three tests per 10 $m^2$ at representative test locations of a completed repair area. Final number of testing shall be determined by the Superintendent.

The mode of failure shall be determined by visual inspection of the test specimens and categorised as follows:

- Mode 1: Tensile failure within the existing concrete substrate
- Mode 2: Tensile failure within the repair material
- Mode 3: Bond failure at the interface between the existing concrete substrate and the repair material
- Mode 4: Bond failure between the adhesive layer and the dolly
- Mode 5: Partial bond failure at the interface between the existing concrete substrate and the repair material and partial tensile failure within the repair material
- Mode 6: Partial bond failure at the interface between the existing concrete substrate and the repair material and partial tensile failure within the existing concrete substrate

Where a combination of modes of failure exist the percentage of each mode of failure shall be recorded to the nearest 10% based on the surface area of the failure face.

The mean bond strength at 7 days shall not be less than 0.75 MPa, with no individual result less than 0.65 MPa.

The mode of failure of the pull-off test shall be in accordance with Mode 1, with tensile failure within the existing concrete substrate.

Mean bond strengths less than 0.75 MPa or failure modes 2, 3, 4, 5 and 6 shall be raised as a non-conformance.

#### *B15.13.1.3 Testing for Drummy Areas*

A visual inspection of all concrete repair areas shall be conducted immediately prior to the application of any decorative/anticarbonation coating for delaminations and any defects recorded.

The test for drummy areas shall be conducted using a small hammer along the whole surface area of the concrete patch repairs and delaminated areas shall be characterised by a ‘drummy’ or hollow sound.

Delaminated patch repairs shall be removed and repaired in accordance with the requirements of this section.

Testing for drummy areas shall be conducted in the presence of the Superintendent.

### *B15.13.2 Work Records*

#### *B15.13.2.1 Test Results*

The Contractor shall supply for review by the Superintendent a copy of all quality control testing including photographic records within one week of undertaking such testing.

#### *B15.13.2.2 Non-conformances*

For any test batch that fails to meet the specified standards, all repairs to which the test batch relates shall be removed and the repairs repeated in accordance with the requirements of this section.

#### *B15.13.2.3 Daily Records*

Further to *Standard Specification G2 Contract Management Plan* daily records shall be kept of the following:

- Stability of Structure
- Reinforcement Surface Finish
- Materials - Generic Types, Brand Names and Batch Numbers
- Temperature Records
- Curing regime.

## B15.14 CONTRACTOR COMPETENCY

Personnel, sub-contractors and suppliers utilised in cementitious patch repair of concrete shall have a minimum of 5 years experience in the repair and rehabilitation of reinforced concrete structures and a demonstrated competency for surface preparation and application of the repair material to be applied.

The concrete repair supervisor shall be trained and qualified on all aspects of application techniques and shall be present at all times during repair work. Application personnel shall be trained and skilled in the application procedures of the repair material to be applied.

Documented evidence shall be available to demonstrate experience, qualification, skills and training of personnel, sub-contractors and suppliers.

## B15.15 EXTENSIVE REPAIRS

Conventional pre-mixed concrete shall be used for any extensive repairs as detailed in this Specification or on the drawings.

Preparation shall be in accordance with this Specification, except that impact methods may be used for bulk concrete removal.

Concrete shall be Grade S40 for inland locations and Grade S50 within 1 km of the coast, tidal estuaries or other bodies of salt water, in accordance with *Standard Specification B10 Supply of Concrete*, unless otherwise specified.

Reinforcement shall be placed at the locations detailed in the Specification or as shown on the drawings. Splicing to the existing structure shall be by full penetration butt-welding or by laps in accordance with *AS 5100*. Supply and placement of reinforcement and concrete shall comply with *Standard Specification B11 Reinforced, Prestressed and Mass Concrete*.

## B15.16 PAYMENT

Payment for concrete repairs shall be at the items as listed in the Schedule of Rates.

Payment shall include the provision of all plant, labour and materials required for traffic control, access, scaffolding, shoring and propping, formwork, preparation, repairs, curing and the disposal of any debris.

## B15.17 HOLD POINTS

The following hold points have been identified in this specification:

Hold Points identified in this Specification are listed in *Table B15.2 – Hold Points.*

***Table B15.2 – Hold Points***

| Clause Ref | Description | Nominated work not to proceed | Evidence of Compliance |
|---|---|---|---|
| B15.5 | Assessment of concrete | Concrete patch repairs | Assessment of concrete received by Superintendent for review |
| B15.5 | Alternative concrete repair methods | Concrete patch repairs | Proposal to use alternative repair methods or materials to be submitted to the Superintendent for approval |
| B15.8.1 | Preparation and application | Concrete patch repairs | Any deviations from the Manufacturers Specifications shall be submitted to Superintendent, along with certification from the Manufacturer, for review |
| B15.8.3.3 | Non-corrosion deteriorated or defective concrete repair | Application of repair material | Depth of removal of concrete and exposure to concrete reinforcement to be reviewed by Superintendent |
| B15.8.5 | Reinstatement of prepared areas | Application of repair mortar | Reinstatement of prepared areas shall not commence until:<br>(i) a joint measurement of the repair area by the Superintendent and the Contractor has taken place<br>(ii) evidence that the preparation of the repair area conforms to the requirements of this Specification<br>(iii) the Contractor's quality procedures has been sighted and approved by the Superintendent. |


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