
NZTA P33: 2017

**SPECIFICATION FOR
COLOURED SURFACINGS**

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1. INTRODUCTION

This is a performance-based specification for the application of coloured surfacings (excluding high friction surfacings) on appropriate substrates. It applies to pavements that may be trafficked by vehicles and/or cycles and/or pedestrians.

This specification applies where the substrate is provided by either the Client or the Contractor.

The expected life of a coloured surfacing provided under this specification shall be five (5) years.

2. REFERENCED DOCUMENTS

ISO (1993). Part A02: Grey scale for assessing change in colour, Textiles — Tests for colour fastness, ISO 105-A02:1993. International Standards Organisation, Genève, Switzerland.

ISO (1993). Part A03: Grey scale for assessing staining. Textiles – Tests for colour fastness, ISO 105-A03:1993, International Standards Organisation, Genève, Switzerland.

NZRF. (2009). NZRF Roadmarking Materials Guide, New Zealand Roadmarkers Federation Inc, Auckland. <http://www.nzrf.co.nz/techdocs/NZRF-Materials-Guide.pdf>

NZTA (2013). Specification for State Highway skid resistance management, NZTA T10 Specification: 2013. NZTA, NZ Transport Agency, Wellington.

Standards Australia (1999). Method 42: Pendulum friction test, Methods for sampling and testing aggregates, AS 1141.42-1999, SAI Global, Sydney.

Standards Australia (2011). Colour standards for general purposes, AS 2700 – 2011, SAI Global, Sydney

Standards Australia, (2011). Colour Standards for general purposes – Swatches, AS 2700S – 2011, SAI Global, Sydney

Standards Australia (2013). Slip resistance classification of existing pedestrian surface materials, AS 4663:2013, SAI Global, Sydney.

Standards Australia (2013). Guide to the specification and testing of slip resistance of pedestrian surfaces, SA HB 198:2014, SAI Global, Sydney.

3. DEFINITIONS

Term	Definition
Aggregate	Cover material applied to the binder.
Aggregate coating	All materials used to cover and/or colour aggregate.
Aggregate retention	Ability of the binder to adhere to, and retain, the aggregate under traffic, and during cleaning and maintenance operations.
Binder	Any resin used to bond the aggregate to the existing substrate.
BPN	British Pendulum number
Cleaning agents	All materials used to remove dirt, grime, fuel, oil and other materials from the surface of the substrate.
Coloured surfacing	Coloured Surfacing that complies with this specification.
Delamination	Failure of the coloured surfacing to adhere to the substrate onto which it is placed.
Expected Life	The expected period of time during which the roadmarking shall continue to comply with the minimum specified performance criteria. The minimum expected life is to be five (5) years or as specified by the engineer in the contract documents.
Manufacturer	The manufacturer of the coloured surfacing binder.
Mask	<p>Where the existing line marking and delineation, systems, symbols, manholes, grates, etc. are covered or protected before installation of the coloured surfacing commences.</p> <p>The masking allows the line marking and delineation, systems, symbols, manholes, grates, et to remain in place and ensures they are unaffected by the installation of the coloured surfacing.</p> <p>Masking is removed after installation of the coloured surfacing is complete.</p> <p>The masking itself shall not affect the line marking and delineation, systems, symbols, manholes, grates, etc.</p>
MSDS	Material Safety Data Sheet
Nominated design	The design submitted by the Contractor under Clause 7.
Pavement temperature	The temperature measured at the surface of the pavement over which the coloured surfacing is to be applied.
Pot life	Period for which two mutually reactive chemicals remain usable when mixed. Specifically, the length of time that a catalysed resin system retains a viscosity low enough to be used in processing.

Term	Definition
Priming material	Any substance used to prepare the substrate for the application of binder. Priming materials may also be used to improve the adhesion of the binder to the substrate.
Raveling	Ravelling describes pavement surface deterioration that occurs when aggregate particles are dislodged. The coloured surface loses its smooth surface and begins to appear very open and rough.
Sample	A portion of material drawn from a lot, in accordance with any relevant specification, technical standard, test method or AS requirements, for the purpose of testing.
Skid resistance value	The friction measured in accordance with NZTA T10 Specification: 2013
Stripping	Loss from the coloured surfacing of aggregate that has been in contact with, or embedded in, the binder film. This does not include the loss from the surface of aggregate that has been applied in excess of the design rate during the surfacing operation.
Substrate	The surface onto which the coloured surfacing is applied.

4. WARRANTY

4.1 Normal areas

The installation and maintenance of the surfacings applied under this specification shall be guaranteed by the contractor under the terms described by a contract schedule. The contractor guarantee shall bind the contractor in agreement to the principal and warrant that the materials used are fit for the purpose and that the markings will satisfy the performance requirements for the warranted period as specified in the contract documents but limited to a maximum of five (5) years.

4.2 High wear areas

High wear areas will have a shorter warranty period than normal areas, as agreed with the engineer. The Engineer may agree to variations for any extra work required during the warranty period on abnormal areas.

5. STRENGTH OF THE SUBSTRATE

Where the substrate is provided by the Client, the Contractor shall check the suitability of the substrate prior to application of the coloured surfacing, including visual inspection, and request asphalt strength information or other tests by agreement. Additional information can be found in NZ Transport Agency research report 543 'Pavement design for specialist surfacing'.

The Contractor and the Client shall agree the suitability of the substrate prior to application and have this documented.

6. DESIGN

Materials used in the work shall be not less in quality to the sample tested for the purpose of design, and the sample panel supplied at the time of tendering.

The selection of coloured surfacing materials and the design of the coloured surfacing shall be in accordance with the manufacturer's recommendations to suit the specified application, and to meet the requirements of the Contract.

Considerations in the coloured surfacing materials selection and the coloured surfacing design may include:

- a) The condition of the underlying materials including their expansiveness
- b) The environment including, but not limited to, the following characteristics of the site: rainfall, temperature, humidity and wind profiles, and surface and subsurface water conditions;
- c) The surfacing including consideration of existing surface texture and porosity;
- d) Geometry including cross fall and grade;
- e) Drainage including surface drainage;
- f) The Contractor's traffic management plan and construction procedures;
- g) The Contractor's construction traffic, expertise, labour, plant and equipment;

The Contractor shall submit details of the proposed design together with certification for the nominated materials to the Client at least 14 days prior to commencement of work. The following information must be included as part of the coloured surfacing design submission–

- a) Declaration that all residual materials are in accordance with the New Zealand Environmental Protection Authority's legislative and regulatory requirements.
- b) Documented evidence of prior use and longevity for similar application of the proposed coloured surface coating to no less than five years in heavily trafficked areas. If a product has not been in the market place for five years, documentation of appropriate laboratory tests and field tests must be submitted to the client for the client's consideration.

No works shall commence until the Contractor receives written advice from the Client that work can proceed. The submitted design shall be referred to as the "nominated design" and shall include the construction and testing procedures.

If the Contractor proposes to vary the nominated materials and/or the nominated design, the Contractor shall submit a new nominated design in accordance with this clause. No

works using changed materials or a changed design shall commence until the Contractor receives written advice from the Client that work can proceed.

7. SUPPORTING DOCUMENTATION

The Contractor shall provide the following supporting documentation for the supply and installation of their coloured surface system proposed for use in the contract:

- a) Internationally-recognised Certification, if available (e.g. Roads and Bridges Agrément Certificate under the British Board of Agrément's Highway Authorities Product Approval Scheme);
- b) Written references from local authorities if certification in accordance with (a) above is not available;
- c) Evidence that the manufacturer(s), or their New Zealand agent, have agreed to the Contractor's use of their product, and any conditions attached to this;
- d) Quality Assurance documentation;
- e) The ingredients of any material shall meet regulatory requirements, and in particular the Hazardous Substances and New Organisms Act 1996. Classification and group standard(s) shall be provided for all materials;
- f) Installation Method Statement.

8. PREPARATION OF EXISTING SUBSTRATE SURFACE

8.1 Prior-to-site establishment

At least 14 days before substrate preparation works are commenced the Contractor shall provide the Client with written notice of the Contractor's intention to commence preparation of the substrate. This notice shall include a report detailing the existing pavement substrate's surface condition and the pavement shape including:-

- a) areas that are considered by the Contractor to be unsuitable for coloured surfacing so that the requirements of this specification cannot be met; and
- b) any pavement substrate's surface repairs/treatments outside the scope of this specification that the Contractor considers should be completed in order to meet the requirements of this specification (e.g. patching).

The Contractor shall prepare procedures for site and substrate preparation including:

- a) as applicable, removing, protecting, covering, replacing and/or rectifying damage to pavement delineation systems, devices, etc (e.g. components like raised pavement markers, line marking, symbols);
- b) as applicable rectifying any damage to the pavement due to the above;
- c) cleaning and preparation of the substrate; and
- d) removal and disposal of loose and foreign materials.

8.2 Upon site establishment

8.2.1 Cleaning

The Contractor shall evaluate the cleanliness and suitability of the substrate's surface condition according to the manufacturer's instructions and shall take all necessary action to clean and prepare the substrate's surface. Prior to placement of the coloured surfacing, the Contractor shall remove all loose material, grit, stones, vegetative matter, rubbish and other deleterious materials from the area of works. This includes the Contractor:

- a) ensuring that dust laitance and other loose or deleterious materials including oil, grease, grime and spills are removed;
- b) ensuring that cleaning and preparation shall not cause damage to the existing pavement surface, pavement structure or underlying pavement materials; and
- c) removing from the site all cleaning agents and collected material in accordance with the New Zealand Environmental Protection Authority's legislative and regulatory requirements for the type of waste generated.

Cleaning of the substrate's surfacing may include, but is not limited to, the following:

- a) use of a sweeper, high pressure air or other methods; and/or
- b) washing with a mild detergent, rinsing and drying using a hot compressed air lance.

8.2.2 Pavement markings

The existing pavement markings at the site may be covered by the surfacing by the Contractor as part of the site preparation works, or may be masked to ensure the coloured surfacing is not applied to the markings.

All Raised Pavement Markers (RPMS), Retro-reflective Raised Pavement Markers (RRPMs) and the like may either be removed from the area of works prior to any coloured surfacing being placed, or masked to ensure the coloured surfacing is not applied to any RPMS and RRPMs.

Where RPMS and RRPMs are removed:

- a) any unsound residual glue shall also be removed prior to application of the coloured surfacing; and

- b) the Contractor shall replace them, like for like, as part of the works.

Any damage caused by the removal of pavement marking and or other delineation devices, symbols or systems etc. (e.g. RPMs and RRPMS) shall be repaired by the Contractor prior to placement of coloured surfacing. The proposed methods of removal and repair shall be submitted to the Client for approval.

9. APPLICATION

The manufacturer's recommendations shall be followed. Notwithstanding, the NZRF Roadmarking Materials Guide shall apply as a minimum.

10. PRIMING MATERIALS

If recommended by the manufacturer, the recommended priming materials shall be applied to the substrate prior to the application of the coloured surfacing.

11. COLOURED SURFACING SYSTEM

The system shall:

- a) provide adhesion to the constituent parts and substrate consistent with the requirements of the Contract.
- b) be resistant to fuel and oils spills over the life of the coloured surfacing;
- c) be stable under UV light and in New Zealand weather conditions so that the performance of the binder chemical properties and physical properties shall meet the specified performance requirements;
- d) not emit offensive odours such that complaints are received by the Client or the New Zealand Transport Agency;
- e) provide an adequate system thickness and have appropriate stability so as to ensure that the system will satisfy the requirements of the Contract;
- f) be able to be vacuum/mechanically broomed and high pressure water cleaned without damage.

At the time of mixing and application to the substrate and at the prevailing ambient temperatures (air and pavement), the system shall have a sufficient pot life to:

- facilitate the application of a uniform thickness of the system to the pavement substrate, and
- achieve adhesion to both the substrate and constituent parts.

12. COLOUR OF THE SYSTEM

Dried colour swatches of the proposed coloured surfacing material(s) shall be prepared and submitted to the Client for approval prior to application. The swatches are to be visually close to the specified colour(s), and duplicate swatches shall be retained by the Client and Contractor for future reference.

The coloured surfacings are required to achieve a close colour match to the colour swatch(s) agreed by the Client at the time of application and shall remain visually close to the agreed colour swatch throughout the warranty period.

The Client may specify that the coloured surface shall be a close colour match to one of the following AS 2700S – 2011 colours described in Table 12.1.

Nominal red	Preferred colour R13 Signal Red Acceptable alternative R54 Raspberry
Nominal green	Preferred colour G13 Emerald Acceptable alternative G26 Apple Green G36 Kikuyu
Nominal blue	B24 Harbour Blue
Nominal yellow	Preferred colour Y14 Golden Yellow Acceptable alternative Y13 Vivid Yellow
Local Area Traffic Management & Calming (nominal Terracotta)	R52 Terracotta

13. CLEAN UP OF WORK

Following application of the coloured surfacing, all masking material shall be removed together with any material adhering to it.

When the system has been evenly applied and all the binder has completely cured, any remaining cover aggregate spread in excess of the specified or ordered rate shall be removed by a vacuum sweeper or equivalent means prior to the opening of the site to (general) traffic.

Prior to opening to traffic, excess aggregate shall be removed from:

- the cycleway;
- the road;

- kerb;
- kerb and channel;
- public utility plant covers;
- drainage structures;
- manholes etc;
- driveways; and
- any trafficked and un-trafficked areas.

Material which becomes loose after the initial clean-up shall be removed at 24 hours, 3, 7, 14 and 28 days after opening to general traffic or as otherwise directed by the Client.

A vacuum sweeper or equivalent shall be used to remove the loose material from the works and/or the proximity of the works. The following are not permitted:

- mechanical sweeping;
- manual sweeping with a steel broom.

14. PERFORMANCE REQUIREMENTS

14.1 Warranty period

The warranty period for coloured surfacings shall be five (5) years.

14.2 General

The Contractor shall:

- prepare the substrate;
- select and design the materials;
- target the nominated design; and
- control all processes needed to achieve the performance requirements during the period of the Contract.

The Contractor shall be responsible for monitoring and maintaining the coloured surfacing from the time of placement to the end of the warranty period.

The Contractor shall not be held liable for any failures of coloured surfacing that occurs as a result of a failure within the underlying layers unless it is a result of the Contractor's activities related to the preparation for or placement of the coloured surfacing.

The Contractor shall not be held liable for any damage to the coloured surfacing resulting from "external" sources, including but not limited to –

- a) Traffic incidents that cause damage from gouging or fire;
- b) Materials falling off vehicles; and
- c) Overtopping of the road surface with water for more than 24 hours in a single continuous period as a result of flooding. This does not include normal road surface runoff which occurs during rainfall events.

Notwithstanding the above, exposure to sunlight and the weather are not included in "external" sources.

14.3 Performance limits

14.3.1 General

During the warranty period, the coloured surfacing shall meet the requirements of this specification and the Contract.

The coloured surfacing shall be able to withstand traffic stresses without damage, and shall be able to be vacuum broomed and high pressure water cleaned without damage.

14.3.2 Surface friction

a) State highways

On state highways acceptance of the coloured surfacings skid resistance shall be by SCRIM+ methodology as employed within the NZTA High Speed Data Contract (HSDC).

Throughout the warranty period, the skid resistance performance shall be in accordance with the NZ Transport Agency Specification for State Highway skid resistance management, NZTA T10 Specification.

Where SCRIM is not an appropriate measure for surface friction, skid resistance investigations may be carried out using either the British Pendulum Tester or GripTester. The readings from these pieces of equipment should be converted to a SCRIM co-efficient (SC) using the conversion equations outlined in the NZTA T10 Notes to the Specification: 2013.

b) Local roads and pedestrian areas

On local roads and pedestrian areas the skid resistance may be measured by a British pendulum tester (BPT) in accordance with AS 1141.42-1999. On footpaths, slip resistance shall be tested by a British pendulum in accordance with SA HB 198:2014 and AS 4663-2013. At the time of inspections (see 15.1 Monitoring) the British pendulum numbers (BPN) for slider 55 rubber shall be in accordance with Table 14.1.

Site category 1 and some category 2 sites as detailed in contract.	70 BPN min.
Balance of carriageway sites and shoulders.	60 BPN min
Footpaths	45 BPN min

14.3.3 Macrotexture

Both State Highways and Local Roads shall conform to the macrotexture (surface texture depth) requirements of NZTA T10 Specification.

14.3.4 Visual performance parameters

Performance requirements assessed visually include the following:

a) Uniformity

To achieve a uniform surface, the coloured surfacing shall:

- have a uniform system thickness; and
- be free from bars and stripes unless otherwise specified or required by the contract documents.

b) Delamination

At any time during the warranty period, the area of the coloured surfacing work which has delaminated shall not exceed 1% in any square metre or 0.1% of the total area of the work.

c) Ravelling

At any time during the warranty period, the area of the coloured surfacing work which has ravelled shall not exceed 1% in any square metre or 0.1% of the total area of the work.

d) Stripping

At any time during the warranty period, the coloured surfacing that has stripped and separated the binder from the cover aggregate shall not exceed 1% in any square metre and 0.1% of the total area of the work.

e) Bleeding

At any time during the warranty period, the coloured surfacing binder shall not bleed nor result in shiny areas where the aggregate has been submerged/flooded by the binder.

f) Surface cracking

At any time during the warranty period, the coloured surfacing shall not crack where cracking is not reflected from the underlying pavement (as identified in the existing pavement surface condition report for the lot).

g) Obscuring pavement marking

RPMs, RRPMS, pavement delineation devices, systems, markings etc. All RPMs, RRPMS, pavement markings, etc shall:

- remain in place; and
- be suitably visible.

Any combination of the above failures must not exceed 1% in any square metre or 0.1% of the total area of the work.

14.4 Colour

Coloured surfacings must be an approximate match to the agreed colour specified in Table 12.1 when placed. Aged coloured surfacings shall not shift more than a value of four when the original swatch is compared with the on-site colour by using ISO 105-A02:1993 or ISO 105-A03:1993.

15. NON CONFORMITIES AND DEFECTS

15.1 Monitoring

The Contractor is responsible for the following monitoring and reporting:

- An initial inspection shall be undertaken when the coloured surfacing is four to six weeks old and the results reported to the Client
- An additional inspection shall be undertaken when the coloured surfacing is 12 months old
- A final inspection shall be undertaken when the coloured surfacing is 24 months old and the results reported to the Client.

Monitoring at 12 months may be by drive-over but in cases of doubt or when requested by the Client a visual inspection on foot or other testing may be required.

Should any defect occur the Contractor shall notify the Client of the defect(s) within 48 hours of identification and respond as outlined in clause 15.2 and 15.3.

At any time after 24 months but during the warranty period the Client shall notify the Contractor if intervention is required due to the coloured surfacing not meeting the minimum performance requirements.

15.2 Non-conformities

If a section or area of the coloured surfacing fails to comply with this specification, initially or during the warranty period, the failure(s) shall constitute nonconformity under the Contract.

The nonconforming section or area of the coloured surfacing shall be rectified or replaced such that the areas comply with this specification.

The cost of rectifying or replacing nonconformities, including any restoration work to any underlying or adjacent surface or structure, which becomes necessary as a result of such rectification or replacement, shall be borne by the Contractor.

Materials removed from the site by the Contractor shall be replaced with materials which conform to this Specification. Removal of loose cover aggregate shall be carried out as set out in Clause 13.

Additionally:

- a) throughout the warranty period, all delamination and ravelling shall be rectified by the Contractor; and
- b) any areas in which the binder and/or aggregate is insufficiently applied, shall be rectified by the Contractor.

Repairs and rectification work, and replacement work, shall be completed as follows:

- a) Unless caused by “external sources’ as defined in Clause 14.2 by the Contractor at the Contractor’s cost;
- b) The Contractor shall cooperate with the Client to monitor and assess the performance of the coloured surfacing during the warranty period, and to determine any required rectification.
- c) If at any time during the construction and warranty period the Client notifies the Contractor that intervention is required due to not meeting the minimum performance requirements, the Contractor shall rectify the defects through repair or replacement such that safety of the public and preservation of the asset are not compromised, or as directed by the Client. Unless otherwise specified or directed the response time for repairs shall be:
 - i) severe delamination will be rectified within one week;
 - ii) cracking and ravelling will be rectified within two weeks; and
 - iii) all other repairs within four weeks of notification by the Client.
- d) Where the Contractor fails to rectify by repair and/or replacement of a non-conformity in accordance with c) above, the Client may rectify the defective work. The cost of such rectification will be a debt due from the Contractor to the Client.

15.3 Remedial action

Defective coloured surfacing shall be removed and replaced as follows:

Small areas up to 0.25m² may be cut back to straight, sound edges and in filled back to level, provided that:

- The area patched is no more than 0.1% of the total area
- The patching is visually acceptable
- The patching will have a life equally as long as the surrounding surfacing.

Larger areas shall be treated as follows:

- milled and patched out;
- squared-up to the extent of the width of the traffic lane; and
- retreated with a 50mm overlap with the existing coloured surfacing.

Defective areas shall not be overlaid with additional coloured surfacing.

Rectification by patching must only be applied to the whole of squared areas bounded by masking material. Undefined freehand or freeform patching is unacceptable.

The Contractor shall advise the Client in writing of the proposed treatment for any repairs before undertaking the work.

The Final Certificate shall not be issued until all defects have been suitably repaired or replaced to the satisfaction of the Client.