SPECIFICATION FOR ANTI-GRAFFITI COATINGS

NZTA S10

29 OCTOBER 2020

1. SCOPE

This specification is based on Austroads technical specification ATS-5820 *Anti-graffiti coatings* and specifies the requirements for the supply and application of anti-graffiti coating systems to structures, roadside furniture and traffic controller boxes. It excludes the application of coating systems to the face of traffic signs.

2. DEFINITIONS

The definitions in AS/NZS 2310 apply to this specification.

3. REFERENCED DOCUMENTS

Australian/New Zealand Standards

AS 1580	*Paints and related materials – Methods of test*
	Method 108.2 Dry film thickness – Paint inspection gauge
	Method 403.1 Scratch resistance
	Method 408.5 Adhesion – Pull-off test
AS/NZS 1580	*Paints and related materials – Methods of test*
	Method 481.1.2 Coatings – Exposed to weathering – Discolouration (including bronzing)
	Method 481.1.11 Coatings – Exposed to weathering – Degree of chalking
	Method 481.1.12 Coatings – Exposed to weathering – Degree of colour change
AS 1627	*Metal finishing – Preparation and pretreatment of surfaces*
	Part 1 Removal of oil, grease and related contamination
	Part 4 Abrasive blast cleaning of steel
AS/NZS 2310	*Glossary of paint and painting terms*
AS/NZS 2311	*Guide to the painting of buildings*
AS/NZS 2312	*Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings*
	Part 1 Paint coatings (AS 2312.1)
	Part 2 Hot dip galvanizing
AS 2700	*Colour standards for general purposes*
AS/NZS 4548	*Guide to long-life coatings for concrete and masonry*
	Part 5 Guidelines to methods of test

ASTM International

ASTM D4263	*Standard test method for indicating moisture in concrete by the plastic sheet method*
ASTM D4414	*Standard practice for measurement of wet film thickness by notch gages*
ASTM D6578	*Standard practice for determination of graffiti resistance*

Austroads

AGBT-T750	*Test method – effectiveness of anti-graffiti coatings*
ATS-5343	*Coating of concrete*
ATS-5820	*Anti-graffiti coatings*

Australian Paint Approval Scheme (APAS)

Specification 1441	*Permanent graffiti barrier*
Specification 1442	*Temporary graffiti barrier*

NZ Transport Agency

SP/M/022	*Bridge manual*
Protective coatings for steel bridges: a guide for bridge and maintenance engineers	
NZTA S9	*Specification for coating steelwork on highway structures*

Other

Testing method for anti-graffiti products. Document No 6706-02-2238, Main Roads Western Australia

Report R4-97 *New Zealand weathering steel guide for bridges*. HERA

4. QUALITY SYSTEM REQUIREMENTS

4.1 The Contractor must prepare and implement a quality plan that includes:

a. details of the proposed coatings, including the manufacturer's instructions, evidence of coatings compliance to the test method(s) given in 6.1, specifications, materials safety data sheets and materials technical data sheets

b. unless the coating system is included in an approved/registered products system, test certificates (not more than 24 months old) and records of the past performance of the proposed coatings which demonstrate compliance with this specification

c. names, experience and qualifications of the coatings application supervisor and key personnel

d. detailed work method statement (WMS)/procedures for substrate preparation, operation of equipment and application of the coatings

e. inspection and test plans (ITPs) that will verify conformance to this specification.

4.2 The WMS/procedures and ITPs must:

a. cross reference all applicable specification clauses

b. identify all performance requirements and hold points.

Hold point 1	
Process held	Commencement of surface preparation and application of the coating
Submission details	The quality plan must be provided at least 21 days prior to the commencement of the coating application.

5. CONTRACTOR COMPETENCY

5.1 The Contractor warrants that they (or the subcontractor, if the repair work is being undertaken by a subcontractor) are suitably skilled and experienced in undertaking the application of the specified anti-graffiti coatings.

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

5.3 Personnel applying the coatings must be suitably trained and skilled in the application of the specified anti-graffiti coatings.

6. MATERIALS

6.1 The coating must be tested in accordance with test method AGBT-T750 to demonstrate compliance with table 1, unless the Contract documents permit coatings approved under Australian Paint Approval Scheme Specification 1441 (non-sacrificial) and Specification 1442 (sacrificial).

Table 1: Test method AGBT-T750 acceptance criteria

Property	Test	Acceptance criteria
Graffiti removal 24 hours after graffiti application	AGBT-T750.4.2	Min 4
Graffiti removal 72 hours after graffiti application	AGBT-T750.4.2	Min 4
Graffiti removal after artificial weathering	AGBT-T750.4.2	Min 4
Graffiti removal after artificial salt spray exposure	AGBT-T750.4.2	Min 4
Attack on the coating by alternative removal agents – mineral turpentine	AGBT-T750.4.3	Not more than 10% of the coating removed
Adhesion to selected substrates – concrete	AS 1580.408.5	> 2.0MPa
Scratch resistance of coating after 7 days, applied to compressed cement sheet	AS 1580.403.1	≤ 600 grams
Burn resistance of coating after 7 days, applied to compressed cement sheet	AGBT-T750.4.6	Equal or greater burn resistance when compared to cured exterior acrylic paint
Weathering resistance of coating (without graffiti applied)	AGBT-T750.4.7	
Discolouration	AS/NZS 1580.481.1.2	≤2 after exposure to 1000 hours QUV
Degree of chalking	AS/NZS 1580.481.1.11	≤2 after exposure to 1000 hours QUV
Degree of colour change	AS/NZS 1580.481.1.12	≤2 after exposure to 1000 hours QUV
Liquid permeability of the coating (sacrificial coatings only)	AGBT-T750.4.8	Coating fully penetrated into substrate

Note: As an alternative to test method AGBT-T750, the Main Roads WA Testing method for anti-graffiti products *and ASTM D6578 are also acceptable compliance test methods.*

6.2 Unless specified otherwise on the drawings or other Contract documents, the anti-graffiti coating system must be non-sacrificial, which complies with the following in that it:

a. is an acrylic copolymer, acrylic epoxy, polysiloxane, polyurethane or polyurea type

b. is clear or pigmented to a specified colour

c. is non-yellowing and UV resistant for its guaranteed exposure life

d. exhibits low dirt retention capability

e. is impermeable to chlorides, water, carbon dioxide and acid rain but allow the transmission of water vapour

f. carries a guaranteed outdoor exposure life of not less than 10 years and a guaranteed 'graffiti removal' life of at least 8 cycles of defacement and removal from the date of application.

6.3 If a sacrificial anti-graffiti coating is specified, it must carry a guaranteed outdoor exposure life of not less than 5 years from the date of application.

6.4 Where a primer or undercoat is required as part of the anti-graffiti coating system, it must be a different colour to that of the final nominated colour and in accordance with AS 2700.

6.5 All coats in the system must be of the same brand and compatible with each other. The coating pigments must be colourfast, and not subject to fading or discolouration.

7. PROTECTION OF WORKS, PEOPLE AND PROPERTY

7.1 The Contractor must:

a. protect the surfaces listed in 12.2 and any other surfaces which are to remain uncoated (such as previously painted surfaces, services, bearings, joints, and nameplates) during the surface preparation process and during coating application processes

b. remove all coating drips and droppings, smudges and over spray from all surfaces, including surfaces not being treated

c. except to the extent permitted under the Contract, not disrupt the passage of people and vehicles

d. ensure that the coated works are protected from adverse conditions, dust and debris during the curing period of the coating system in accordance with the requirements of 8.1.

7.2 Spray painting must not be carried out within 10m of buildings, footpaths, roadways, pedestrians or vehicles unless less protective measures or methods are used.

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

8. SURFACE PREPARATION

8.1 This specification applies to bricks, sandstone, limestone, timber, acrylic plastic, aluminium, painted steel, previously painted surfaces and cementitious substrates (such as normal concrete, lightweight concrete, glass fibre reinforced concrete, concrete blocks, cement render). However, to achieve the required level of performance, substrates other than sound concrete may require additional preparation treatment which is not described in this specification. For all substrates, the selected anti-graffiti coating must be compatible with the surface to be painted and for coated steel applied in accordance with the relevant part of NZTA S9 *Specification for coating steel highway structures.*

8.2 The surface preparation must be in accordance with this specification, the manufacturer's instructions/recommendations and AS/NZS 2311 or AS 1627.1 as appropriate.

8.3 All dust, dirt and other surface contaminants must be removed. The surface must then be washed with water so grease and oil contaminants, including remnants of curing membranes, are removed from the surface by the use of appropriate solvents or detergents followed by the water washing in accordance with AS 1627.1.

8.4 The substrate must be free of all graffiti, graffiti shadows, paints, or any other surface contaminants which would be visible through the coating.

8.5 Where shadows of previously removed graffiti are likely to be clearly visible through a coating, a suitable anti bleed stain sealer must be applied prior to the application of any subsequent coatings.

8.6 Where required to promote adhesion of the coating system, some concrete and other substrate surfaces may be cleaned by whip blasting with a fine grade garnet or surface etched with an approved

acid wash followed by a water wash in accordance with AS 1627.1. Any abrasive blast cleaning must be carried out in accordance with AS 1627.4 and applicable regulations.

8.7 Where a non-sacrificial anti-graffiti coating is used, any highly porous substrates must be pre-treated (such as a pore filling primer coat) to ensure that the surface is suitable for the application of a final anti-graffiti finish. For relatively soft surfaces, the primer and/or finish coat must also offer surface binding and toughening effect.

8.8 The Contractor's inspection and test plan must include requirements for the inspection and recording of the following:

a. surface moisture conditions of concrete and other substrates satisfy the manufacturer's recommendations

b. moisture content of concrete and other substrates is free of water back pressure to satisfy the manufacturer's recommendations in accordance with ASTM D4263

c. the degree of surface cleanliness is as specified

d. immediately before painting, the prepared surface has had all loose dust and other foreign material removed

e. the surface is not contaminated by any means after preparation and before painting.

9. HANDLING AND STORAGE OF COATING MATERIAL

9.1 Materials must remain in their original, sealed containers until time of use and must be stored in strict accordance with the manufacturer's instructions/recommendations.

9.2 All material must be brought to site in the original unopened cans clearly labelled with the appropriate manufacturer's name, product type, reference number and batch number.

9.3 The Contractor must provide, for each batch of coating material, a copy of the manufacturer's information as specified below:

a. manufacturer's name and address

b. product reference

c. batch number/identification

d. certificate of date of manufacture.

9.4 The Contractor must maintain records showing which elements were treated with each coating batch.

9.5 Materials stored beyond the manufacturer's recommended shelf life must not be used. The material must be used in the order of manufacture.

9.6 All coating materials must be free from contamination, gelling, drying out, heavy skin formation and severe segregation of ingredients when used.

9.7 Coating materials which have exceeded the pot life recommended by the manufacturer must not be used.

9.8 The Contractor's inspection and test plan must include requirements for the inspection and recording of the following:

a. materials are the correct materials for the system which is to be applied

b. material containers are sound and not damaged in any way which may have caused or will cause the contents to deteriorate

c. the material in the containers has not dried, gelled, formed a heavy skin or unduly settled

d. the material is stirred, mixed, or thinned in accordance with the manufacturer's recommendations, multi part materials mixed in the correct proportion, a reaction time for multi part materials if

specified by the material manufacturer must be allowed and materials must not be used once their pot life has expired

e. the application method is appropriate for the material.

10. ENVIRONMENTAL CONDITIONS

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

a. windy conditions where over spray and/or spatter may be generated

b. wind-borne debris is likely to contaminate the uncured surface of the freshly applied coating

c. ambient temperature exceeds 35°C or is below 10°C

d. relative humidity exceeds 85%

e. rain spatter, or run-off, including leakage through deck joints, contaminating the surface and adversely affecting the adhesion to the substrate may occur

f. substrate surface is wet or damp

g. surface temperature of the substrate is less than 3°C above the dew point calculated in accordance with AS 2312.1 or exceeds 40°C

10.2 If the environmental conditions deteriorate during the application process and no longer comply with 10.1, the work must be discontinued and if necessary, newly coated surfaces must be protected from damage.

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

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

11. TRIAL APPLICATION

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

Hold point 2	
Process held	Commencement of the full-scale coating works.
Submission details	Submission of the test panel and/or notification of the trial application must be provided at least 14 days prior to the commencement of coating work.

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

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

12. APPLICATION OF THE ANTI-GRAFFITI COATING SYSTEMS

12.1 The application of coating systems must be carried out in accordance with:

a. the manufacturer's instructions/recommendations (including drying and curing requirements and overcoating time intervals for the prevailing environmental conditions)

b. this specification

c. AS/NZS 2311 or AS/NZS 2312 (as appropriate)

d. NZTA S9 *Specifications for coating bridge steelwork*

Witness point 1	
Process held	Commencement of the full-scale coating works.
Submission details	Notification of the proposed date for commencement of the surface preparation and coating works.

12.2 For the application of anti-graffiti coatings on existing painted steel, the compatibility between the existing coating and the anti-graffiti coatings must be in accordance with clause 5.6 of *Protective coatings for steel bridges* and outlined in the NZTA S9 *Specifications for coating bridge steelwork* or be confirmed by a test application approved by the Engineer.

Anti-graffiti coating must not be applied to the following surfaces or materials:

a. steel coated with thermoset coatings (for example, Colorbond™ steel)

b. stainless steel

c. hot-dipped zinc/aluminium alloy coated steel (for example, Zincalume steel).

For weathering steel surfaces, refer to section 6.3 of HERA Report R4-97. Based on trials carried out, it is recommended that the use of a chemical graffiti softener followed by hot water (preferably steam) jetting is the most suitable method for the removal of graffiti from a weathering steel substrate.

12.3 Anti-graffiti coating systems must not be applied earlier than specified in table 2.

Table 2: Minimum time required between substrate placement and application of anti-graffiti coating systems

Substrate	Minimum elapsed time after placement of substrate (days)
Cast in-situ concrete or Non-accelerated cured precast concrete	28*
Steam or radiant heat cured concrete	14
Repair of concrete using with proprietary cementitious materials	14
Repair of concrete using normal concrete	28

** However, an anti-graffiti coating may be applied between 14 and 28 days after concrete placement if it can be established, using a commercially available calibrated moisture meter, that the concrete moisture content is less than10% and the concrete surface is dry at the time of application.*

12.4 The substrate must not be coated until it is surface dry. Sufficient time must elapse between coatings to allow the initial coat to dry and cure.

12.5 The finished coating must be smooth, of uniform thickness, colour and appearance and without runs, beads or surface crazing. It must be free of any defects that may impair the performance or appearance of the coating for the life of the coating.

12.6 For penetrating anti-graffiti coating systems applied to full saturation, the minimum amount of penetration into the substrate and minimum application rate must be in accordance with the manufacturer's recommendations.

12.7 If the coating is to be applied to an equipment housing (for example, a traffic controller housing), the following applies:

a. any decals must be removed prior to the application of the coasting and replaced afterwards

b. the applied coating must not impede the function or operation of key locks, latches, doors or photocells

c. any air vents must be sealed during spraying to prevent the ingress of moisture and/or paint into the interior.

12.8 The Contractor's inspection and test plan must include requirements for the inspection and recording of the following:

a. surface moisture conditions of the substrate satisfy the manufacturer's recommendations

b. moisture content of concrete and other substrates free of water back pressure to satisfy the manufacturer's recommendations, in accordance with ASTM D4263

c. the environmental conditions, as specified in 10, satisfied

d. uniformity, colour, gloss, opacity and appearance of the top coat are in accordance with the requirements of the specification

e. the top coat is free of any defects that may impair the performance or appearance of the coating for the life of the coating.

13. TESTING

13.1 All test certificates must be issued by a laboratory which is accredited by IANZ, NATA, or a member of the International Laboratory Accreditation Cooperation.

13.2 Following application of the final coat, the coating must be tested for compliance with table 3 and:

a. 85% of DFT measurements must be more than 90% of the specified thickness

b. 85% of DFT measurements taken in the $1m^2$ test area must be more than the specified thickness.

Table 3: Final coat testing requirements

Property	Minimum frequency	Test method	Acceptance criteria
Bond strength	1 test per 50m²	Aluminium dollies with a minimum diameter of 50mm in accordance with AS 1580.408.5	2.0MPa
WFT	1 test per 50m²	ASTM D4414	≥ 175µm
DFT	1 test per 50m²	AS 1580.108.2 using a paint inspection gauge	≥ 100µm

Notes:

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

14. COATING REPAIRS

14.1 Non-compliant work includes:

a. a failure to comply with any specified environmental constraint

b. a failure to comply with the manufacturer's instructions or any requirement of this specification

c. yellowing, loss of adhesion, or colour change of the coating at any time during the defects liability period.

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

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

Hold point 3	
Process held	Commencement of repair work.
Submission details	Details of the scope of the repair work and a procedure for the repair work must be provided at least 7 days prior to the commencement of the repair work.

15. REQUIREMENTS FOR FUTURE MAINTENANCE OF COATINGS

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

a. the methods of preparation to be used in the event that re-coating of the coated surface is required

b. Which types of coating, other than the original product, are compatible with the finish coat for re-coating purposes

c. the technique which can be used to repair local damage to the coating, with particular reference to colour and gloss matching of finish coats applied after a time lapse of 5 years.

15.2 The most appropriate techniques for cleaning of the finish coat to remove surface soiling must be used, with particular reference to ease of removal of graffiti or glued posters, where possible, without damage to the existing finish.

16. ANNEXURE A: SUMMARY OF HOLD POINTS, WITNESS POINTS AND RECORDS

16.1 The following is a summary of the witness points and hold points that apply to this specification and the records that the Contractor must submit to the Principal to demonstrate compliance with this specification.

Clause	Hold point	Witness point	Record
4.2	1. Submission of quality plan and acceptance of supplier		Quality plan, including details of approvals, certification and/or test results
11.1	2. Commencement of the full-scale coating works		Submission of the test panel and/or notification of the trial application
12.1		1. Notification of the proposed date for commencement of the surface preparation and coating works	
13.2			Test results
14.3	3. Commencement of repair work		Procedure for repair work