

**Main Roads
Technical Standard**

MRTS85A

**Repainting Existing Steel Bridges
and New Steel Bridges
Zinc Metal Systems**

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Table of Contents

	Page
1 INTRODUCTION.....	1
1.1 General	1
1.2 Design Life	1
1.3 Registration.....	1
2 DEFINITION OF TERMS	1
3 REFERENCED DOCUMENTS	1
4 QUALITY SYSTEM REQUIREMENTS.....	2
4.1 Hold Points, Witness Points and Milestones	2
4.2 Construction Procedures	2
4.3 Conformance Requirements	3
4.4 Testing Frequency	3
4.5 Inspection.....	3
5 MATERIALS.....	3
5.1 General	3
5.2 Test Certificate.....	3
5.3 Acceptance	3
5.4 Dry Film Thickness and Curing Time.....	3
5.5 Approved Products.....	3
5.6 Registration of Zinc Metal Paint Systems	3
6 PAINTWORK.....	3
6.1 General	3
6.2 Defective Steelwork	4
6.3 Preparation of Surface Prior to Painting	4
6.4 General	4
6.4.1 Preparation Required for Existing Steelwork.....	4
6.4.2 Preparation Required for New Steelwork	4
6.4.3 Preparation for Top Coating Existing Paint Systems.....	4
6.5 Water Blaster	4
6.6 Assessment of Substrate	5
6.7 Categories for Repainting	5
6.8 Paint Systems	5
6.8.1 Full coating system on steelwork with 30 year design life.....	5
6.8.2 Top Coat of existing Zinga Liquid Galvanizing – 30 year design life.....	5
6.8.3 Full paint system on steelwork within 15 years design life	5
6.8.4 Top coat of existing ZingaMetall Acryltop with 15 year design.....	5
7 APPLICATION OF PAINT	6
7.1 General	6
7.2 Condition of Steelwork	6
7.3 Coatings Applied Above Road Level	6
7.4 Coatings Applied Below Road Level.....	6
7.5 Weather Conditions	6
7.6 Acceptance Criteria.....	6
7.7 Repair.....	7
7.8 Storage of Paint	7
8 RED LEAD WASTE	7
8.1 Collection of Waste	7
8.2 Disposal of Waste	7
8.3 Storage of Waste	7
9 STATUTORY REQUIREMENTS	8
9.1 General	8
9.2 Legislation.....	8
9.3 Work safe Australia Standard	8

10	COMPLIANCE	8
10.1	Painting Procedure	8
10.2	Health of Workers	8
10.3	Waste.....	9
10.4	Competent Person.....	9
10.5	Regulated Area.....	9
10.6	Painting.....	9
11	MATERIAL REQUIREMENTS.....	10
11.1	Generic Description Zinga Liquid Galvanizing – Primer or Stand Alone Coating System	10
11.2	Generic Description ZingaMetall Acryltop Finishing Coats	10
12	SUPPLEMENTARY REQUIREMENTS	11

Repainting Existing Steel Bridges and New Steel Bridges – Zinc Metal Systems

1 INTRODUCTION

1.1 General

This Standard applies to repainting existing steel bridges and new steel bridges with zinc metal paint systems.

This Standard shall be read in conjunction with MRTS01 *Introduction to Technical Standards*, MRTS50 *Specific Quality System Requirements* and other Technical Standards as appropriate.

This Technical Standard forms part of the Main Roads Specifications and Technical Standards Manual.

1.2 Design Life

The paint systems consisting of two coats of Zinga Liquid Galvanizing has a design life of 30 years. This system is metallic grey colour and is the recommended system. If a specific colour is required; the paint system consisting of one coat of Zinga Liquid Galvanizing and two coats of ZingaMetall Acryltop has a design life of 15 years.

The conditions **Hold Point 1** that shall be satisfied for application of the paint systems are –

- a) Zinga Liquid Galvanizing shall be applied directly to the prepared steelwork;
- b) An existing Zinga Liquid Galvanizing top coat shall be recoated with a topcoat of Zinga Liquid Galvanizing; and
- c) An existing ZingaMetall Acryltop top coat shall be recoated with the same paint.

1.3 Registration

The requirements for repainting bridges include the use of suppliers and products for the items listed in Table 1.3 that are registered by Transport and Main Roads.

Table 1.3 – Items Requiring Use of Registered Suppliers and Products

Clause	Category of Work
5.7	Zinc Metal Paint System

Registered suppliers and products for the above items are listed in Clauses 5.2 and 5.3 and detailed in the relevant clauses in Annexure MRTS85A.1

For further information regarding registered suppliers and products for the above items refer to –

Queensland Department of Transport and Main Roads
Bridge Branch
GPO Box 1412
Brisbane Qld 4001

2 DEFINITION OF TERMS

The terms used in this Standard shall be as defined in Clause 2 of MRTS01 *Introduction to Technical Standards*.

3 REFERENCED DOCUMENTS

Table 3 lists documents referenced in this Technical Standard.

Table 3 – Referenced Documents

Reference	Title
AS 1580	<i>Paints and related materials – Methods of test – Introduction and list of methods</i>
AS 1627.4	<i>Metal finishing – Preparation and pretreatment of surfaces – Abrasive blast cleaning of steel</i>
AS/NZS 2312	<i>Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings</i>
AS 4361.1	<i>Guide to lead paint management – Industrial applications</i>
APAS 2916/2	<i>Australian Paint Approval Scheme – Organic zinc rich coating for protection of steel – durable one coat single pack</i>
ISO 8501	<i>Visual Assessment of Surface Cleanliness</i>
ISO 8503	<i>Surface Roughness Characteristics of Blast-Cleaned Substrates; and</i>
ISO 8504	<i>Surface Preparation Methods</i>
NOHSC:1012	<i>National Standard for the Control of Inorganic Lead at Work</i>
NOHSC:2015	<i>National Code of Practice for the Control and Safe Use of Inorganic Lead at Work</i>
NOHSC:1003	<i>National Exposure Standards</i>

4 QUALITY SYSTEM REQUIREMENTS

4.1 Hold Points, Witness Points and Milestones

General requirements for Hold Points, Witness Points and Milestones and specified in Clause 5.2 of MRTS01 *Introduction to Technical Standards*.

The Hold Points and Milestones applicable to this Standard are summarised in Table 4.1. There are no Witness Points defined.

Table 4.1 – Hold Points and Milestones

Clause	Hold Point	Milestone
1.2	1. Applicable system	
5.1	2. Approval of paint system	Submission of proposed paint system (21 days)
5.3	3. Acceptance of paint	
6.7	4. Classification of repaint areas	
10.1	5. Approval of painting procedure	Submission of painting procedure (28 days)

4.2 Construction Procedures

The Contractor shall prepare documented procedures for all construction processes in accordance with the quality system requirements of the Contract.

Construction procedures for those activities listed in Table 4.2 shall be submitted to the Administrator in accordance with the quality system requirements of the Contract.

Table 4.2 – Construction Procedures

Clause	Procedure
10	Painting procedures

4.3 Conformance Requirements

The conformance requirements which apply to lots of work covered by this Standard are summarised in Table 4.3.

Table 4.3 – Conformance Requirements

Clause	Procedure
5	Properties of paint
7	Acceptance of paintwork

4.4 Testing Frequency

The minimum testing frequency for work covered by this Standard is specified in Clauses 5.4 and 7.6.

4.5 Inspection

The Administrator will carry out examination of the work and shall be given reasonable access to the Site for the purpose. Hold points for inspection shall be agreed between the Administrator and the Contractor before work commences. The Administrator may refer to the Contractor's records of other jobs as the basis for inspection. Defects shall be marked with school grade chalk, adhesive inspection labels or masking tape.

5 MATERIALS

5.1 General

Paint shall not contain lead or chromium. Paint with lead or chromium compounds exceeding 0.2 percent of the dried paint mass shall not be used.

The Contractor shall submit the proposed paint system with full technical data sheets to the Administrator at least 21 days prior to ordering paint. **Milestone**

Paint shall not be ordered until the product has been approved by the Administrator. **Hold Point 2**

5.2 Test Certificate

Paint shall be manufactured to a system in accordance with AS 9001.

The manufacturer shall supply a test certificate for each production batch of paint.

5.3 Acceptance

Paint shall not be used until the production batch has been accepted by the Administrator. **Hold Point 3**

5.4 Dry Film Thickness and Curing Time

The dry film thickness and curing times shall be in accordance with Annexure MRTS85A.1.

5.5 Approved Products

Approved Products are listed in the Appendix of MRTS85A. Alternative products may be submitted to the Administrator for approval.

5.6 Registration of Zinc Metal Paint Systems

Zinc Metal Paint Systems shall be a registered system (refer to Clause 1.3)

Registered Systems are listed in Clauses 5.2 and 5.3 respectively and are detailed in Annexure MRTS85A.1. Alternative products including full technical details of the alternative formulation may be submitted to the Administrator for approval.

6 PAINTWORK

6.1 General

The scope of the work to be undertaken under the Contract shall be as stated in Clause 1 in Annexure MRTS85A.1.

6.2 Defective Steelwork

Prior to preparation for repainting, the Contractor shall notify the Administrator of any defective steelwork and propose corrective action [refer to Hold Point 3].

6.3 Preparation of Surface Prior to Painting

6.4 General

The method of specifying and assessing the degree of surface preparation prior to painting shall be in accordance with the requirements of the following Standards –

- a) ISO 8501 *Visual assessment of surface cleanliness;*
- b) ISO 8503 *Surface roughness characteristics of blast-cleaned substrates;* and
- c) ISO 8504 *Surface preparation methods.*

Surface preparation grades are defined in ISO 8501 as follows –

St 2 Thorough hand and power tool cleaning

When viewed without magnification, the surface shall be free from visible oil, grease and dirt, and from poorly adhering mill scale, rust, paint coatings and foreign matter.

St 3 Very thorough hand and power tool cleaning

As for St 2, but the surface shall be treated much more thoroughly to give a metallic sheen arising from the metallic substrate.

6.4.1 Preparation Required for Existing Steelwork

All surfaces shall be washed clean.

All rusty steel shall be prepared back to sound metal using a needle gun or abrasive blasting. All surfaces shall be blasted with potable water at 5,000 psi pressure and water flow of 22 L/min to remove all dirt, grease and loose metal.

A “St 3” surface preparation classification is required in accordance with the requirements of ISO 8504 with a surface profile of 35 – 50 microns.

6.4.2 Preparation Required for New Steelwork

The surface shall be abrasive blasted with fresh garnet to AS 1627.4 to Sa 2.5 with an anchor blast profile 50 – 70 microns.

6.4.3 Preparation for Top Coating Existing Paint Systems

Remove all surface contamination and loose and under-bound existing coatings.

All existing coatings that are removed or dislodged by this process shall be chased back with the cleaning nozzle to a point where the coating is well adhered and sound.

All edges of the remaining coating shall be scraped back with a painter's scrapper to ensure that the original coating shall be sanded smooth to feather out the leading edge of the paint film.

The area where the paint has delaminated shall be abraded before applying the new coating. The degree of surface preparation shall depend on the condition of the surface.

The existing paint systems shall be high pressure water washed to remove surface contamination and corrosion product.

6.5 Water Blaster

A water blaster is defined as a specialist purpose-built item of plant. Spraying equipment is not permitted to be used as a water blaster.

6.6 Assessment of Substrate

The contractor shall use ISO 8501 to assess, classify and record the grade of preparation and surface profile and roughness characteristics of the newly prepared surface. The following procedure from Clause 5, Note 2 of ISO 8501 shall be used –

For previously painted surfaces that have been prepared for renewal painting, only photographs (in ISO 8501) with rust grade designations D or C may be used for the visual assessment. The choice depends on the degree of pitting.

ISO 8503 Defines the surface roughness.

6.7 Categories for Repainting

Prior to preparing for repainting, the existing steel work shall be classified by the contractor and accepted by the Administrator as one of the categories listed in this clause. **Hold Point 4**

- a) Full coating shall include –
 - i) all areas where the steelwork is rusty; and
 - ii) areas where the paint work is crazed, cracked or delaminated,
- b) Top coating only

Top coating only includes only existing paintwork which is in good condition.

6.8 Paint Systems

6.8.1 Full coating system on steelwork with 30 year design life

- a) Prepare steelwork;
- b) Stripe coat welds, bolts, rivets and edges for each coating;
- c) 1 immediate coat Zinga liquid galvanizing; and
- d) 1 top coat Zinga liquid galvanizing finishing coat.

Refer to Clause 5 of this Technical Standard for material details. Details of method of application, film thickness, and thinner and pot life and recoat times are included in Clause 4 of Annexure MRTS85A.1.

6.8.2 Top Coat of existing Zinga Liquid Galvanizing – 30 year design life

- a) Surface preparation;
- b) Stripe coat of welds, bolts, rivets and edges; and
- c) 1 coat of 90 microns DFT Zinga liquid galvanizing.

Refer to Clause 5 of this Technical Standard for material details. Details of method of application, film thickness, and thinner and pot life and recoat times are included in Clause 5 of Annexure MRTS85A.1.

6.8.3 Full paint system on steelwork within 15 years design life

- a) Prepare the surface;
- b) Stripe coat of welds, bolts, rivets and edges for each coating;
- c) 1 coat Zinga Liquid Galvanizing;
- d) 1 intermediate coat ZingaMetall Acryltop; and
- e) 1 top coat ZingaMetall Acryltop.

Refer to Clause 5 of this Technical Standard for material details. Details of method of application, film thickness, and thinner and pot life and recoat times are included in Clause 6 of Annexure MRTS85A.1.

6.8.4 Top coat of existing ZingaMetall Acryltop with 15 year design

The Zinga Acryltop can only be rejuvenated with Zinga Acryltop.

- a) Prepare the surface;
- b) Stripe coat of welds, bolts, rivets and edges for each surface;

- c) Intermediate coat of ZingaMetall Acryltop 60 microns DFT; and
- d) 1 Top coat of ZingaMetall Acryltop 60 microns DFT.

Refer to Clause 5 of this Technical Standard for material details. Details of method of application, film thickness, and thinner and pot life and recoat times are included in Clause 7 of Annexure MRTS85A.1.

7 APPLICATION OF PAINT

7.1 General

All coatings shall be applied in accordance with the Manufacturer's recommendations. All coatings shall be thoroughly mixed. Thinners shall not be used without the approval of the Administrator.

Each coat shall be applied at the application rate stated in the Annexure MRTS85A.1.

The Curing time for each coat shall be strictly adhered to.

Coatings shall be applied so as to produce a smooth, even coating free of lumps, ripples, sags, air holes and other defects.

A digital electronic paint thickness gauge shall be used; Instruments shall be calibrated in accordance with Method 108.1 of AS 1580 using non-magnetic shims on polished steel.

7.2 Condition of Steelwork

All steelwork shall be dry, clean and free of any loose or flaky material prior to the application of each coat.

7.3 Coatings Applied Above Road Level

All coatings shall be applied with a brush. Spray painting is not permitted because of problems of overspray drifting onto the traffic.

7.4 Coatings Applied Below Road Level

Airless or conventional sprays may be permitted below road surface level if it can be shown that there is not overspray drifting onto the river, a road or pedestrian traffic. Otherwise brush application shall be used.

7.5 Weather Conditions

All coatings shall be applied to a dry metal surface. Coatings shall not be applied when the temperature of the ambient air or the receiving surface is less than 10°C nor when the temperature of the receiving surface is greater than 55°C nor when the humidity is greater than 95%. Paint shall not be applied if adverse weather conditions are likely to occur before it has cured.

The coating shall not be applied when the surface temperature of the metal is within 3°C above the dew point or when the surface is in direct strong sunlight.

The ambient temperature, metal temperature, relative humidity and dew point shall be recorded —

- a) at the commencement of work each day;
- b) at 9.00 am;
- c) at 12.00 noon;
- d) at 3.00 pm;
- e) at finishing time of work; and
- f) with each weather change.

Maximum and minimum temperatures each 24 hours shall be recorded and shall be measured by placing a maximum and minimum temperature thermometer adjacent to the work.

7.6 Acceptance Criteria

The average dry film thickness shall not be less than the specified thickness.

The actual minimum thickness shall not be less than 90% of the specified thickness.

The number of readings taken shall be determined as follows –

- a) for pipe work, the following readings shall be taken –
 - i) For pipes less than 150 mm diameter, 2 readings shall be taken evenly around the circumference per linear metre;
 - ii) For pipes 150 mm to 300 mm diameter, 4 readings shall be taken evenly around the circumference per linear metre; and
 - iii) For pipes 300 mm to 600 mm diameter, 6 readings to be taken evenly around the circumference per linear metre,
- b) for beams and angles where the face is less than 300 mm wide, 1 reading on each flat face for every linear metre; and
- c) For all other areas, a minimum of 3 readings per square metre shall be taken.

7.7 Repair

To reinstate a damaged coating system or to rebuild the dry film thickness, the following procedure shall be followed –

- a) any sharp edges of the damaged coating shall be feathered or tapered;
- b) any oil, grease, dirt or other contaminants shall be removed from the surface with a suitable solvent or oil emulsifier and degreaser and the surface abraded by use of a suitable tool, emery cloth or by whip blasting;
- c) the appropriate coating system shall be applied as specified to the damaged area;
- d) foreign particles shall not be permitted within the coating; and
- e) areas of low thickness shall be rebuilt to that specified, by applying the appropriate coating.

7.8 Storage of Paint

Paint shall be stored in sealed containers in a lock-up store and not exposed to extreme temperature. The temperature of the store shall be kept between 4°C and 35°C. Any special storage conditions recommended by the manufacturer shall be observed.

Paint which has not been used within the shelf life period specified by the manufacturer or within 18 months of manufacture shall be replaced.

8 RED LEAD WASTE

8.1 Collection of Waste

All red lead waste shall be collected in accordance with the requirements of AS 4361.1. The appropriate system shall be determined by risk analysis.

8.2 Disposal of Waste

The Principal will be responsible for the disposal of the red lead waste.

8.3 Storage of Waste

The Contractor shall transport all waste to the location designated in Clause 2 in Annexure MRTS85A.1. All waste shall be contained in 200 litre steel drums. The drums shall be in good sound condition and the lids welded closed. The drums shall be marked by permanent waterproof means with the following information –

- a) Job Name and Job Number;
- b) Description of Contents; and
- c) Toxic Characteristic Leaching Procedure test value in pH 7 solution. (The test shall be undertaken by a laboratory registered by NATA for the test).

9 STATUTORY REQUIREMENTS

9.1 General

In cases where the bridge has been previously painted with toxic red lead paint, special procedures shall be implemented to protect all personnel and the environment.

9.2 Legislation

All relevant Acts and Regulations shall be observed.

Table 9.2 summarises the role of Government Departments administering various aspects of the handling of red lead.

Table 9.2 – Departmental Responsibilities

Department	Role
Department of Employment and Industrial Relations	<ul style="list-style-type: none"> • Health of site staff. • Safety.
Department of Natural Resource and Water	<ul style="list-style-type: none"> • Responsible for all red lead deposited on ground. • Definition of contaminated ground. • Responsible for all red lead deposited in air or water, as well as any red lead likely to be washed from the land into a stream. • Responsible if water from the stream is used for domestic drinking. • Definition of toxic level for stream or air. • Approval of disposal method.
Department of Primary Industries and Fisheries	<ul style="list-style-type: none"> • Shall be consulted if water from the stream is used for irrigation. • Shall be consulted if red lead debris falls onto crops or grazing land.
Port Authority or Harbour Board	<ul style="list-style-type: none"> • Shall be consulted if bridge is located in an area under their authority.

9.3 Work safe Australia Standard

All procedures on the Site shall conform to the following Worksafe Australia Standards –

- National Standard for the Control of Inorganic Lead at Work (NOHSC:1012);
- National Code of Practice for the Control and Safe Use of Inorganic Lead at Work (NOHSC:2015); and
- National Exposure Standards ((NOHSC:1003).

10 COMPLIANCE

10.1 Painting Procedure

The Contractor shall submit a procedure and an Inspection and Test Plan at least 28 days prior to commencing painting **Milestone**. No painting shall be undertaken prior to acceptance of the procedure by the Administrator. **Hold Point 5**

The procedure shall cover at least the topics described in Clauses 10.2 to 10.6, inclusive.

10.2 Health of Workers

The painting procedure shall address the following –

- clothing for site personnel (e.g. overalls, toxic masks, gloves);
- washing and shower facilities;
- hygiene;
- blood testing of workforce for lead levels;

- e) medical supervision of workforce;
- f) induction training for site personnel;
- g) work history of site personnel;
- h) adequate ventilation;
- i) “No Smoking” and “Flammable Liquid” signs;
- j) First Aid kits; and
- k) Training program.

10.3 Waste

The painting procedure shall address the following –

- a) collection, storage and disposal system for toxic debris;
- b) monitoring system to determine percentage of red lead collected;
- c) monitoring system for lead content in ground and stream; and
- d) sampling of waste.

10.4 Competent Person

Within 14 days of being awarded the contract, the Contractor shall nominate in writing, to the Administrator, a Competent Person for the project. This person shall always be present on the Site when any activity involving lead is taking place and shall have the authority to act and implement all procedures required to conform to the Contract.

The duties of the Competent Person include –

- a) testing and issuing of safety equipment;
- b) training staff;
- c) reviewing blood lead levels;
- d) liaising with the Administrator; and
- e) monitoring lead levels on the Site.

10.5 Regulated Area

The Contractor shall define a regulated area within which all lead related activities shall be contained.

10.6 Painting

The Contractor shall be responsible for ensuring that the standard set for surface preparation is maintained, the dry film thickness of paint is as specified, the finish of all paint coats is of a high standard and any areas that may require repairs are reported.

The Contractor shall have a monitoring and recording system for at least the following –

- a) condition of existing paintwork;
- b) surface preparation;
- c) paint system adopted;
- d) thickness of existing paint;
- e) dry film thickness of each paint coat;
- f) batch number of paint used for each layer;
- g) quantity of paint used;
- h) method of application; and
- i) weather.

11 MATERIAL REQUIREMENTS

11.1 Generic Description Zinga Liquid Galvanizing – Primer or Stand Alone Coating System

Protective Coating System

The protective coating system for this contract shall be approved to APAS 2916/2. It shall be a single component coating containing not less the 96% zinc in the dry film, of which at least 97% shall be metallic zinc, to provide cathodic protection to correctly prepared ferrous metal as required by the coating manufacturer for long term protection in accordance with AS/NZS 2312.

The approved coating shall have self- rejuvenating qualities for recoating, repairing or replenishing the originally specified coating system, shall the need occur.

The coating shall be suitable by spray (conventional or airless), brush or roller for applications in varied environmental conditions up to at least 95% relative humidity and temperatures as low as –15 degrees Celsius and as high as 40 degrees. Please refer to manufacturer's data sheet.

The properties required for the coating system shall meet / exceed the following example as a minimum.

The coating shall be approved to APAS 2916/2, defined as a primer or stand alone coating system.

The physical properties of the specific coating shall be –

Generic Type:	Metallic zinc primer/ finishing coat single component;
Volume Solids:	58% ± 2%;
Weight Solids:	80% ± 2%;
Pigment Type:	Zinc powder: 99,995% pure, manifesting as > 96% by weight of the dry film and containing > 97% metallic zinc;
Dry Film Thickness:	60µm DFT per coat (total DFT 120µm for two (2) coat standalone system); 90µm DFT per coat (total DFT 180µm for two (2) coat standalone system);
Binder:	Type II – A thermo plastic aromatic binders;
Type of cure:	Atmospheric cure;
Voc:	Not to exceed 474 g/lt;
Shelf Life:	Unlimited in correctly sealed containers; and
Specific Gravity:	2.67.

An approved product is Zinga Galvanizing supplied by Zintec.

11.2 Generic Description ZingaMetall Acryltop Finishing Coats

Protective over coating System.

The protective coating system for this contract shall be approved to APAS 2916/2. It shall be a single component coating containing not less the 96% zinc in the dry film, of which at least 97% shall be metallic zinc, to provide cathodic protection to correctly prepared ferrous metal as required by the coating manufacturer for long term protection in accordance with AS/NZS 2312.

The finishing coat(s) shall be a single component, semi-gloss acrylic polymer top-coat exhibiting excellent UV and chemical resistance and having additional corrosion- inhibiting pigmentation for long term protection in accordance with AS/NZS 2312.

The approved coating(s) shall have rejuvenation qualities for recoating the originally specified coating system or for maintenance, shall the need to occur. Please refer to manufactures technical data sheets.

Acryltop Generic Properties

The physical properties of the specified finishing coat shall be –

Generic Type:	UV resistant solvent borne acrylic finishing coat, single component;
Volume Solids:	40-43%;
Weight Solids:	50-56%;

Pigment Type:	Acrylic polymers – corrosion inhibiting pigments;
Dry Film Thickness:	60 µm DFT per coat (total DFT 120 µm for two (2) coats);
Binder:	Acrylic thermo plastic aliphatic binders;
Type of cure:	Atmospheric cure;
Voc:	Not to exceed 552 g/L;
Shelf Life:	Unlimited in correctly sealed containers; and
Specific Gravity:	1.15 – 1.28.

An approved project is ZingaMetall Acryltop supplied by Zintec.

12 SUPPLEMENTARY REQUIREMENTS

The requirements of MRTS85A *Repainting Existing Steel Bridges and New Steel Bridges – Zinc Metal Systems* are varied by the supplementary requirements given in Clause 3 of Annexure MRTS85A.1.