

Steel Guardrail Component Paint Standard

Ministry of Forests, Lands and Natural Resource Operations

Where steel guardrail components are specified by the Ministry of Forests, Lands and Natural Resource Operations (the ministry) to be painted, this specification document shall apply. The paint systems described herein are for use in a shop coating environment where the steel substrate is protected from the weather during coating and curing (*field painting, except for touch-up, is not permitted*).

For the purposes of these specifications, the generic term *paint* refers to both liquid paints and powder coatings.

Allowable Paint System Types

Paint systems shall be one of the following three types, except as otherwise approved by the ministry:

Type 1 – Surface Tolerant Epoxy Bottom Coat / Aliphatic Polyurethane Topcoat (Liquid Paint System)

- Bottom Coat: self-priming Epoxy Polyamide (> 50% min. vol. solids) surface tolerant epoxy;
- Top Coat: Acrylic or Acrylic Polyester Polyurethane (>50% min. vol. solids);
- Coatings shall be applied as a system from one Manufacturer only;
- Minimum DFT (dry film thickness) of 8 mils for entire system.

Type 1 Example Liquid Paint Systems				
Manufacturer	Epoxy Bottom Coat		Aliphatic Polyurethane Top Coat	
	Paint Product	DFT (mils)	Paint Product	DFT (mils)
Amercoat Canada	Amerlock 400	5-6	Amercoat 450H	2-3
Cloverdale Paint	Clovagard 8315 Series	5-6	Gemini Armourshield	2-3
Sherwin-Williams	Macropoxy 646FC B58-600 Series	5-6	Acrolon 218HS B65-600 series	2-3
Carboline	Carboguard 635 Epoxy	4-5	Carbothane 133 LH	3-5
Devoe (International Paint)	Bar-Rust 235 or 236	5-8	Devthane 379	2-3

Type 2 – Two Coat Moisture Cure Urethane (Liquid Paint System)

- 2 equal thickness coats - High Solids (>60% min. vol. solids), self-priming Moisture Cure Urethane;
- Coatings shall be applied as a system from one Manufacturer only;
- Minimum DFT of 6 mils for entire system.

Type 2 Example Liquid Paint System				
Manufacturer	Bottom Coat		Top Coat	
	Paint Product	DFT (mils)	Paint Product	DFT (mils)
Sherwin-Williams	Corothane 1 Mio-Aluminum B65S14	3	Corothane1 HS Aliphatic B65-50 Series	3

Type 3 – Zinc Rich Epoxy Bottom Coat / Super-Durable Polyester TGIC Top Coat (**Powder Coat System**)

- Bottom Coat: Zinc Rich Epoxy powder;
- Top Coat: Super-Durable Polyester triglycidyl isocyanurate (TGIC) powder;
- All procedures to be performed in a shop controlled environment to safeguard against any contamination;
- Minimum DFT of 6.5 mils for entire system.

Type 3 Example Powder Coat System				
Manufacturer	Zinc Rich Epoxy Bottom Coat		Top Coat	
	Paint Product	DFT (mils)	Paint Product	DFT (mils)
<u>Bottom Coat:</u> Sherwin-Williams or Tiger Drylac <u>Top Coat:</u> Spectrum Powder Manufacturing	Sherwin-Williams zinc rich epoxy power coat primer: E-2024-2Z / EGS6-00004 ZR Powdura OR Tiger Drylac zinc rich epoxy power coat primer (Dryzinc 69/90701)	3-4.5	Spectrum Super Durable “XP” (YL80-XP2091)	<ul style="list-style-type: none"> • Dust coat 1-2 mils to any area where 100% hiding is unachievable in 1 coat. • Apply 3.5-4.5 mils (DFT) top coat of Safety Yellow to entire surface.

The following surface preparation and general requirements apply to all paint system types:

Surface Preparation

- Prior to painting, the degree of surface preparation of steel substrate surfaces shall be in accordance with the following standards of the Society for Protective Coatings (SSPC):
 - For liquid paint systems: SSPC-SP6 (commercial blast cleaning) with a sharp surface profile of 2 to 3 mils;
 - For powder coat systems: SSPC-SP10 (near-white blast cleaning) with a sharp surface profile of 1 to 2 mils.
- Bottom coat of paint shall be applied as soon as possible after surface preparation, to avoid any possibility of the formation of surface rust. If surface rust appears, surface preparation shall be re-done to meet the requirements of the previous paragraph.

General Requirements

- Gloss “**Safety Yellow**” final colour (paint system shall provide complete hiding);
- Paint products and complete two-coat paint systems, substrate surface preparation methods, and paint application procedures must ensure:
 - good edge coverage of corners and rounded-off welds and sharp edges;
 - proper intercoat adhesion and compatibility with no coat delaminating;
- Liquid paint shall be applied by spraying. Touch ups with brush and roller are allowed in small areas only;
- Paint products shall be utilized and applied in accordance with manufacturer’s specifications;
- Cleaning of steel surfaces and paint application shall follow the general specification SSPC PA1 Shop, Field, and Maintenance Painting of Steel. In case of contradiction between the manufacturer’s specification and SSPC PA1, follow the manufacturer’s specification.

Ministry Evaluation of Alternative Paint Systems

If paint products other than the examples specified above are contemplated, the alternative paint products must be approved by the Ministry Bridge Engineer, located in Victoria (telephone 250-387-2277), prior to painting. Alternative paint systems recognized for BC Ministry of Transportation (BC MOT) shop applications (SS1 to SS4) applied in accordance with BC MOT specifications are typically acceptable to the ministry, however ministry approval must be obtained as described above. BC MOT recognized products are listed at the following website: <http://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/recognized-products-list>

The ministry will consider evaluation of alternative paint products and systems other than those recognized by BC MOT provided they meet both of the following performance requirements:

- Performance measures (steel substrate surfaces): All paint systems applied to prepared steel substrate must be considered, by industry standards, to be high performance liquid paint systems or super-durable Polyester TGIC powder coat systems, exhibiting (1) excellent weather resistance and exterior durability with very good (a) chalk resistance, (b) gloss retention, and (c) corrosion resistance and (2) high performing physical properties such as very good (a) dry film hardness, (b) film adhesion, (c) impact resistance, and (d) abrasion resistance.
- Quantitative performance measures versus AAMA 2604-05. As a quantitative method to objectively benchmark and compare the coating performance properties of different paint systems, the formulation of paint systems must meet the American Architectural Manufacturers Association (AAMA) 2604-05 standard called, "Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels" for the test properties listed below (where tested paint systems are applied to **aluminum substrate** for comparing test results versus AAMA 2604-05):

Weathering:

- Chalk Resistance (ASTM D 4214 Test Method A (Method D 659): Chalking will be no more than that represented by a No. 8 rating (i.e., no smaller than No. 8).
- Gloss Retention ASTM D 523): Minimum of 30% after the exposure test.
- Corrosion Resistance (tests conducted on chromated aluminum panels):
 - Humidity Resistance (ASTM D 2247 or ASTM D 4585): After 3000 hours exposure, no formation of blisters to extent greater than "few" blisters Size No. 8, as per Fig. 4, ASTM D 714.
 - Salt Spray Resistance (ASTM B 117): After 3000 hours exposure, minimum creepage rate of 7, and minimum blistering rate of 8, as per Tables 1 and 2, ASTM D 1654.

Physical Properties:

- Dry Film Hardness: "Grade F" (pencil hardness scale) minimum dry film hardness with no rupture of film as per ASTM D 3363.
- Film Adhesion (dry adhesion, wet adhesion, and boiling water adhesion): No removal of coating.
- Impact Resistance: Direct impact with minimum 3 mm deformation, with no removal of coating from substrate.
- Abrasion Resistance (ASTM D 698): Abrasion Coefficient Value minimum 20.