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**PPG Guide Specification –
Coil and Extrusion Coatings, Liquid and Powder Coating Systems**

SECTION 050513 - SHOP-APPLIED COATINGS FOR METAL

SECTION 05080 - FACTORY-APPLIED METAL COATINGS

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SECTION 050513 - SHOP-APPLIED COATINGS FOR METAL
SECTION 05080 - FACTORY-APPLIED METAL COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1.2 Shop-applied coatings for architectural metals.

A. Related Sections:

- 1.3 Division 01 Section "Sustainable Design Requirements".
- 1.4 Division 05 Section "Pipe and Tube Railings".
- 1.5 Division 05 Section "Decorative Metal".
- 1.6 Division 05 Section "Decorative Metal Railings".
- 1.7 Division 05 Section "Decorative Formed Metal".
- 1.8 Division 07 Section "Metal Roof Panels".
- 1.9 Division 07 Section "Metal Wall Panels".
- 1.10 Division 07 Section "Sheet Metal Roofing".
- 1.11 Division 07 Section "Sheet Metal Flashing and Trim".
- 1.12 Division 07 Section "Roof Specialties".
- 1.13 Division 08 Section "Overhead Coiling Doors".
- 1.14 Division 08 Section "Overhead Coiling Grilles".
- 1.15 Division 08 Section "Aluminum-Framed Entrances and Storefronts".
- 1.16 Division 08 Section "All-Glass Entrances and Storefronts".
- 1.17 Division 08 Section "Automatic Entrances".
- 1.18 Division 08 Section "Revolving Door Entrances".
- 1.19 Division 08 Section "Glazed Aluminum Curtain Walls".
- 1.20 Division 08 Section "Structural-Sealant-Glazed Curtain Walls".
- 1.21 Division 08 Section "Aluminum Windows".
- 1.22 Division 08 Section "Metal-Framed Skylights".
- 1.23 Division 08 Section "Louvers and Vents".
- 1.24 Division 10 Section "Metal Lockers".
- 1.25 Division 13 Section "Metal Building Systems".
- 1.26 Division 08 Section "Louvers and Vents".

127 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
 - 128 AAMA 621 - Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates
 - 129 AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels
 - 130 AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions
 - 131 AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions
 - 132 AAMA 643 – Voluntary Specification, Performance Requirements and Test Procedures for Solar Reflectance Finishes
- B. ASTM International (ASTM):
 - 133 ASTM B 117 - Practice for Operating Salt Spray (Fog) Apparatus.
 - 134 ASTM G 85 annex 5 – Modified Salt Spray Cyclic Fog Test.
 - 135 ASTM D 7091 - Standard Test Method for Nondestructive Measurement of Dry Film Thickness of Nonconductive Coatings Applied to a Nonferrous Metal Base.
 - 136 ASTM D 1654 - Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
 - 137 ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
 - 138 ASTM D 2247 - Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
 - 139 ASTM D 3363 - Standard Test Method for Film Hardness by Pencil Test.
 - 140 ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
 - 141 ASTM E 1980 - Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
- C. U.S. Green Building Council (USGBC): LEED Green Building Rating System, NC (New Construction) Version 4.

142 PERFORMANCE REQUIREMENTS

- A. Solar Reflective Index (SRI): Provide metal roof panel coatings with an initial SRI of not less than 82 or a 3-year aged SRI of 64 for slopes of 2:12 or less, and an initial SRI of 39 or a 3-year aged SRI of 32 for slopes greater than 2:12, per ASTM E 1980.
- B. ENERGY STAR Compliance: Provide metal roof panel coatings identical to those listed on U.S. Department of Energy's ENERGY STAR Roof Products Qualified Product List.
- C. CEC-Title 24 Compliance: Provide metal roof panel coatings with initial solar reflectance not less than 0.70 and emissivity not less than 0.75 per CRRC-1.

143 SUBMITTALS

- A. Product Data: For each type of coating product specified.
- B. LEED Submittals:
 - 144 Product Test Reports for Credit SSpC5: Heat Island Reduction: For metal roof panel coatings to document compliance with solar reflectance index (SRI) requirement.

- A. Samples for Selection: For each color, gloss specified.
- B. Samples for Verification: For each coating product, for each color, gloss and texture specified, on specified substrate.
- C. Product test reports.
- D. Qualifications: For shop-applied coatings Applicator.
- E. Maintenance data.
- F. Warranty: Sample of special warranty.

1.45 QUALITY ASSURANCE

- A. Applicator Qualifications: Coating manufacturer's approved certified applicator, equipped, trained and approved for application of coatings required for this Project, and is approved to provide warranty specified in this Section.

1.46 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, unload and store shop-coated items so that they remain free of damage or deformation. Package and protect items during shipping and handling. Protect stored items from water; stack to facilitate drainage. Keep shop-coated items out of contact with materials that may adversely affect the coating.
- B. Protect shop-coated items with protective covering until installed.

1.47 COORDINATION

- A. Coordinate submittal and selection procedures for items to receive shop-applied coatings. Where items are indicated to match coatings selected for other items, adjust formulations as required to achieve match. Submit samples for verification indicating compliance with matching requirements.

1.48 WARRANTY

- A. Coating Warranty: Coating Applicator's warranty in which Applicator agrees to repair finish or replace coated items that demonstrate deterioration of shop-applied finishes within warranty period indicated.
- B. Exposed Coating: Deterioration includes but is not limited to:
 - a. Color fading in excess of 5 Delta E Hunter units per ASTM D 2244.
 - b. Peeling, checking or cracking of coating adhesion to metal.
 - c. Chalking in excess of a No. 8 per ASTM D 4214, when tested per Method D 659.
 - d. Corrosion of substrate in excess of a No. 6 on cut edges and a No. 8 on field surfaces, when measured per ASTM D 1654.
 - e. Warranty Period: [5] [10] [20] [25] [30] years from date of substantial completion.

PART 2 - PRODUCTS

2.0 MANUFACTURERS

- A. **Basis-of-Design Product:** Provide shop-applied coatings manufactured by PPG, Pittsburgh, PA; (888) 774-4332; Website: www.ppgmetalcoatings.com or comparable products of another manufacturer approved by Architect prior to bid.

2.1 APPROVED COATING APPLICATORS

- A. **Acceptable Applicators:** Provide shop-applied coatings applied by one of the following manufacturer-approved manufacturer-certified applicators:
<Insert list of acceptable applicators>

SUPERIOR & HIGH-PERFORMANCE ORGANIC FINISH MATERIALS – EXTRUSION COATINGS

- A. **Liquid Fluoropolymer Aluminum Extrusion Coatings, AAMA 2605:** Minimum 70% PVDF resin, by weight, in color coat and clear topcoat
- 2.2 Product: **PPG Duranar, Duranar Sunstorm**
Dry Film Thickness, ASTM D 7091: 0.20 mil primer coat plus 1.0 mil color coat, 1.20 mil total, minimum thickness [two-coat system]
- 2.3 Product: **PPG Duranar XL, Duranar GR**
Dry Film Thickness, ASTM D 7091: 0.20 mil primer coat plus, 1.0 mil color coat and 0.4 mil clear topcoat or *Duranar GR* clear topcoat, 1.6 mil total minimum thickness [three-coat system]
- 2.4 Product: **PPG Duranar XLB**
Dry Film Thickness, ASTM D 7091: 0.20 mil primer coat plus 1.0 mil barrier coat, 1.0 mil color coat and 0.4 mil clear topcoat, 2.6 mil total minimum thickness [four-coat system]. Barrier coat is color dependent and required when color coat has low hiding power.
- Seacoast and Severe Environments:
- Pretreatment: A chromium chromate or chromium phosphate coating weight range is required to be greater than 40 mg/ft² as measured by x-ray fluorescence (XRF) per ASTM D5723-95
 - Primer: Liquid chromate primer under liquid and powder topcoats or powder primer under powder topcoats.
 - Clear coat: Optional protection, except for metallic flake or as another barrier coat that can easily be rinsed with fresh water to eliminate salt residue or used to improve chalk and fade resistance
- B. **Liquid Fluoropolymer Aluminum Extrusion Coatings, AAMA 2604:** 50% PVDF resin, by weight, in color coat and Ultra-Durable Polyester
- 2.5 Product: **PPG Acrynar**
Dry Film Thickness, ASTM D 7091: 0.20 mil primer coat plus 1.0 mil color coat, 1.2 mil total minimum thickness [two-coat system]
- Product: **PPG Durastar Ultra-Durable Polyester Liquid Coating**
Dry Film Thickness, ASTM D 7091: 1.0 mil color coat, one coat
- Seacoast and Severe Environments:
- Pretreatment: A chromium chromate or chromium phosphate coating weight range is required to be greater than 40 mg/ft.² as measured by x-ray fluorescence (XRF) per ASTM D5723-95
 - Primer: Liquid chromate primer

- C. **Powder Fluoropolymer Aluminum** Extrusion Coatings, AAMA 2605 Minimum 70% PVDF resin, by weight, in color coat
- 2.6 Product: **PPG Duranar Powder Coating** for normal and severe environments
Dry Film Thickness, ASTM D 7091: 0.20-0.30 mil liquid primer coat or 1.5-3.0 powder primer plus 2.0-4.0 mil *Duranar* powder topcoat, 3.7 – 7.3 mil total minimum thickness
- Seacoast and Severe Environments:
- Pretreatment: A chromium chromate or chromium phosphate coating weight range is required to be greater than 40 mg/ft² as measured by x-ray fluorescence (XRF) per ASTM D5723-95
 - Primer: Liquid chrome primer and powder topcoats or powder primer under powder topcoats
- D. **Powder Fluoropolymer Aluminum** Extrusion Coatings, FEVE Fluoropolymer, AAMA 2605
- 2.7 Product: **PPG Corafion Powder Coating** – one-coat for normal environments
Dry Film Thickness, ASTM D 7091: 2.0 – 4.0 mil, minimum thickness.
- 2.8 Product: **PPG Corafion Powder Coating** – two-coat for severe environments
Pretreatment: A chromium chromate or chromium phosphate coating weight range is required to be greater than 40 mg./ft.² as measured by x-ray fluorescence (XRF) per ASTM D5723-95.
Dry Film Thickness: 0.20-0.30 mils of liquid primer or 1.5-3.0 mils of powder primer plus 2.0-4.0 mil of *Corafion* topcoat
- Seacoast and Severe Environments:
- Pretreatment: A chromium chromate or chromium phosphate coating weight range is required to be greater than 40 mg/ft² as measured by x-ray fluorescence (XRF) per ASTM D5723-95
 - Primer: Liquid primer under powder topcoats or powder primer under powder topcoats.
- E. **Powder Polyester Aluminum** Extrusion Coatings, AAMA 2604
- 2.9 Product: **PPG Envirocron 04 Ultra-Durable Powder Coating**
Dry Film Thickness, ASTM D 7091: 2.0-4.0 mil

F.

HIGH-PERFORMANCE ORGANIC FINISH MATERIALS – COIL COATINGS

- A. **Liquid Fluoropolymer Aluminum** Sheet Coil Coatings, AAMA 2605: 70 percent PVDF resin, by weight, in color coat and clear topcoat
- 2.10 Product: **PPG Duranar, Duranar Sunstorm, Duranar ULTRA-Cool**
Dry Film Thickness, ASTM D 7091: 0.15 mil primer coat plus 0.70 mil color coat, 0.85 mil total, minimum thickness [two-coat system].
- 2.11 Product: **PPG Duranar XL, Duranar GR.**
Dry Film Thickness, ASTM D 7091: 0.15 mil primer coat plus 0.70 mil color coat and 0.45 mil clear topcoat or *Duranar* GR clear topcoat, 1.3 mil total minimum thickness [three-coat system].
- 2.12 Product: **PPG Duranar XLB**
Dry Film Thickness, ASTM D 7091: 0.15 mil primer coat plus 0.70 mil barrier coat, 0.70 mil color coat and 0.45 mil clear topcoat or *Duranar* GR clear topcoat, 2.0 mil total minimum thickness [four-coat system].
Barrier coat is color dependent and required when color coat has low hiding power.
- B. **Liquid Fluoropolymer Aluminum** Sheet Coil Coatings, AAMA 2605: FEVE resin, clear topcoat.
- 2.13 Product: **PPG Corafion XL, Corafion GR**
Dry Film Thickness, ASTM D 7091: 0.6 mil clear coat or *Corafion* GR clear topcoat over *Duranar* color coat.
Gloss Range: 20-80

C. **Liquid Fluoropolymer Steel** Sheet Coil Coatings, AAMA 621: Minimum 70 percent PVDF resin, by weight, in color coat and clear topcoat

2.14 Product: **PPG Duranar, Duranar Sunstorm, Duranar ULTRA-Cool**

Dry Film Thickness, ASTM D 7091: 0.15 mil primer coat plus 0.70 mil color coat, 0.85 mil total minimum thickness [two-coat system]

2.15 Product: **PPG Duranar Plus, Duranar ULTRA-Cool Plus, Seacoast**

Dry Film Thickness, ASTM D 7091: 0.80 mil primer coat plus 0.80 mil color coat, 1.60 mil total minimum thickness [two-coat system]

2.16 Product: **PPG Duranar XL, Duranar GR**

Dry Film Thickness, ASTM D 7091: 0.15 mil primer coat plus 0.70 mil color coat and 0.45 mil clear topcoat, 1.30 total minimum thickness [three-coat system]

2.17 Product: **PPG Duranar XL Plus, Duranar XL ULTRA-Cool Plus, Seacoast**

Dry Film Thickness, ASTM D 7091: 0.80 mil primer coat plus 0.80 mil color coat and 0.80 clear topcoat, 2.40 Mil total minimum thickness [three-coat system].

2.18 Product: **PPG Duranar XLB**

Dry Film Thickness, ASTM D 7091: 0.20 mil primer coat plus 0.80 barrier coat, 0.80 mil color coat and 0.40 clear topcoat, 2.20 mil total minimum thickness [four-coat system]. Barrier coat is color dependent and required when color coat has low hiding power.

Seacoast and Severe Environments:

- a. Pretreatment: A chromium chromate or chromium phosphate coating weight range is required to be greater than 40 mg./ft.² as measured by x-ray fluorescence (XRF) per ASTM D5723-95.
- b. Primer: Thick film liquid chromate primer under liquid topcoat.
- c. Clear coat: Optional protection, except for metallic flake or as another barrier coat that can easily be rinsed with fresh water to eliminate salt residue or used to improve chalk and fade resistance.

D. **Liquid Fluoropolymer Steel** Sheet Coil Coatings, AAMA 621: FEVE resin, clear topcoat

2.18 Product: **PPG Coraflox XL, Coraflox GR** over *Duranar* color coat

Dry Film Thickness, ASTM D 7091: 0.6 mil clear coat

Gloss Range: 20-80

INTERIOR & EXTERIOR ORGANIC FINISHING MATERIALS – EXTRUSION COATINGS

A. Liquid acrylic and polyester one-coat finishes meeting AAMA 2603

1. Product: **PPG Duracron, Polycron**
2. Dry Film Thickness, ASTM D 7091: 1.0 mil +/- 0.2 mil.

B. Powder polyester one-coat finish meeting AAMA 2603

1. Product: **PPG Envirocron 03**
2. Dry Film Thickness, ASTM D 7091: 2.5 mils +/- 0.5.

INTERIOR ORGANIC FINISHING MATERIALS – COIL COATINGS

C. Liquid acrylic and polyester one coat finish:

1. Product: **PPG Duracron**
2. Dry Film Thickness, ASTM D 7091: 0.75-0.85 mils.

FINISHES

A. Pretreatment: Mechanically clean and chemically pretreat fabricated items in accordance with coating manufacturer's requirements and AAMA requirements for finish indicated.

B. Application: Apply primer and finish coats in accordance with coating manufacturer's requirements for finish indicated.

SUPERIOR & HIGH-PERFORMANCE ORGANIC TOUCH UP AND RESTORATION FINISH MATERIALS

A. **Liquid Fluoropolymer Touch up and Restoration coatings**, AAMA 2605: Minimum 70% PVDF resin or FEVE resin.

2.18 Product: **PPG Duranar ADS (air dry system) PVDF**

Dry Film Thickness, ASTM D 7091: 1.0 mil color coat, minimum thickness [one-coat system]

Product utilized mainly for surface scratches and applied with finger nail brush, aerosol or spray gun. If scratch is down to metal an Alodine pencil should be used direct to metal. Primers should be used when scratch is down to metal or if improved adhesion is required.

2.19 Product: **PPG Coraflon ADS (air dry system) FEVE over Duranar and Coraflon Coatings**

Existing caulk, sealant, and residue/contamination to be completely removed from substrate to be coated by means deemed appropriate by contractor. Do not coat over caulking. If caulking is not removed, and is painted up to caulking, coating subject to delamination along caulk edge.

- 1.) Surface Preparation: Solvent Clean, per SSPC SP-1, the substrate to remove any contamination that may be present, including any silicone residue and chlorides.
- 2.) Abrade substrate, similar to SSPC-SP-2/3, to remove any loose factory coatings and field applied coatings, sheen, contamination, while creating a minimum surface profile of 1.0 mil. on both any bare metal and coated substrates.
- 3.) Corroded Surface: Prepare any corrode surfaces similar to per SSPC SP-15, Commercial Grade Power Tool Cleaning, removing existing coatings, rust, oxides, mill scale, while obtaining a surface profile of 1.5 to 2.0 mils. Feather sand edges. **Prime the same day to avoid oxidation.** Apply one coat of Coraflon ADS 511/512 Primer, using multiple passes spraying, @ 3.0 – 5.0 mils DFT. May require multiple passes or coats to achieve recommended dft. All edges and bolts to be stripe coated.
- 4.) Prior to coating, solvent wipe or “tack” off substrate to remove dust and residual contamination.
- 5.) Before each coating operation, surface will be clean, dry, contamination free.

Primer – to be supplied by PPG Industries, Inc.

Apply one coat of Coraflon ADS 511/512 Primer, using multiple passes spraying, @ 2.0 – 3.0 mils DFT. May require multiple passes or coats to achieve recommended dft. All edges and bolts to be stripe coated.

Coraflon Intermix-Color Permitting – to be supplied by PPG Industries, Inc. Gloss or Satin Finish

Apply one coat of Coraflon ADS, using multiple passes spraying,

@ 1.8 – 2.2 mils DFT. May require multiple passes or coats to achieve recommended dft. All edges and bolts to be stripe coated.

Coraflon™ ADS Metallic coatings require a clear finish coat. The clear coat protects the aluminum pigmentation from ultra-violet degradation. Allow metallic topcoat to dry 4 hours minimum before topcoating. Light Mica colors may require a barrier coat ADS564 @ 1.5 to 2.2 mils DFT. Coastal Environments may require a Coraflon Clear Coat. *Micas and Metallic colors are conventional spray application.*

SHOP-APPLIED COATINGS SCHEDULE

SUPERIOR AND HIGH-PERFORMANCE ORGANIC LIQUID FINISHES FOR ALUMINUM AND STEEL EXTENSIONS

- B. High-Performance Organic **Liquid** Finish for **Aluminum Extruded** Items: **[2-coat] [3-coat] [4-coat]** fluoropolymer finish: AAMA 2604 or AAMA 2605.
Coated Items: <Insert list of extruded items to receive high-performance organic finish>
Color: [Match custom sample] [As selected from manufacturer's full range] [As designated or scheduled]
<Insert color>.
Gloss: [10-40] [As selected from manufacturer's full range] [As designated or scheduled].
- C. High-Performance Organic **Liquid** Finish for **Aluminum Sheet** Items: **[2-coat] [3-coat] [4-coat]** fluoropolymer finish: AAMA 2605.
Coated Items: <Insert list of extruded items to receive high-performance organic finish>
Color: Match custom sample [As selected from manufacturer's full range] [As designated or scheduled]
<Insert color>.
Gloss: [10-80] [As selected from manufacturer's full range] [As designated or scheduled].
Concealed/ Backer Finish: Pretreat substrate and apply coating applicator's standard acrylic, polyester or epoxy finish in accordance with manufacturers' requirements.
- D. High-Performance Organic **Liquid** Finish for **Steel Sheet** Items: **[2-coat] [3-coat] [4-coat]** fluoropolymer finish: AAMA 621.
Coated Items: <Insert list of extruded items to receive high-performance organic finish>
Color: [Match custom sample] [As selected from manufacturer's full range] [As designated or scheduled]
<Insert color>.
Gloss: [10-80] [As selected from manufacturer's full range] [As designated or scheduled].
Concealed/ Backer Finish: Pretreat substrate and apply coating applicator's standard acrylic, polyester or epoxy finish in accordance with manufacturers' requirements.

SUPERIOR AND HIGH-PERFORMANCE ORGANIC POWDER FINISHES FOR ALUMINUM AND STEEL EXTENSIONS

- A. High-Performance **Powder** Finish for **Aluminum** Extruded Items (AAMA 2604 or 2605) and **Steel Items** Fabricated from Shapes and Plates:
Coated Items: <Insert list of extruded items to receive high-performance organic finish>.
Color: [Match custom sample] [As selected from manufacturer's full range] [As designated or scheduled]
<Insert color>.
Gloss: [Medium, 20 - 80] [As selected from manufacturer's full range] [As designated or scheduled].
Surface: [Smooth] [Rough texture, glossy surface] [Fine texture] [As selected from manufacturer's full range] [As designated or scheduled].

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to individual specifications sections for installation requirements for items receiving shop-applied coatings.

3.2 PROTECTION

- A. Remove protective wrap from coated items at time of installation.

[END OF SECTION 05 5 13]

[END OF SECTION 05

