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****GENERAL REWRITE. – PLEASE READ CAREFULLY.****

PAINT / POWDER COATING SHOP APPROVAL

GENERAL

Painting and / or powder coating of all miscellaneous steel products shall conform to the Iowa Department of Transportation specification requirements (Article 2408.02.2) and the manufacturer's recommendations shall be followed regarding surface preparation, steel temperature and application. Painted / powder coated surfaces shall have a smooth, uniform, adhering coat free of over spray, mud cracking, runs, sags, cracks, holidays, pinholes, craters, and / or any other defects.

Acceptance of all painted miscellaneous steel products shall be on the basis of shop approval and on certification from an approved paint / powder coating shop. Surface coating can be applied either by the conventional spray methods or by the powder coating methods as required by the contract documents.

The fabricator shall be required to communicate with the galvanizer and indicate that the galvanized articles may be painted and / or powder coated to avoid water or chromate quenching. Galvanizing of miscellaneous steel products shall be performed in accordance with the latest requirements of ASTM A 123 / A 123M hot dip process. The bath composition of molten metal shall contain not less than an average value of 98% zinc by weight. Fasteners shall be galvanized to the latest requirements of ASTM F 2329 or ASTM B 695 Class 55, Type 1.

SURFACE PREPARATION OF GALVANIZED SURFACES

The galvanized steel surfaces shall be prepared and coated as soon after galvanizing as possible (within 24 hours or less) of the galvanizing operation. There should be no visible signs of rust, white powder, zinc oxide, or zinc hydroxide.

All preparation, sweep blasting, and cleaning of galvanized surfaces for painting and / or for powder coating shall be done in the same shop to ensure single source of responsibility for the entire coating system.

Prior to painting and / or powder coating all surfaces shall be free of moisture, dirt, oil, grease, scale, rust or any other detrimental matter to ensure optimum adhesion and coating performace.

Note: Due to a wide variety of substrates, surface preparation methods, and application methods, the applicator shall evaluate for adhesion and compatibility and follow paint and / or manufacturers recommendations.

PAINT SHOP APPROVAL

Each paint shop shall be approved PRIOR to the commencement of any paint work for the State of Iowa. Paint shops seeking approval shall provide the Central Materials Office a written application to become an approved paint shop. The application shall include the following:

1. Quality control procedures that the company has established to ensure quality paint work.
2. Source and type of paint
3. Sand blasting (outdoor, indoor and size of bulk sand hopper)
4. Painting bay (size in square feet, heated, unheated)
5. Paint storage room (heated, unheated)
6. Hoist (capacity in tons)
7. Lighting minimum requirement 50 foot-candles (lm/ft^2)
8. Ventilation systems
9. Humidity/temperature/air flow
10. Qualified/certified painter
11. Paint certification
12. Storage of painted items
13. Shipping & handling

PRE-PAINTING APPLICATION REQUIRMENTS

1. Surface Preparation
    a. Galvanized
    b. Non-galvanized
2. Pretreatments or Blasting (SSPC Requirements), profile measurement
3. Material Handling & Storage
4. Approved Paints
    a. Primer

b. Topcoat

c. Three-coat System

5. Mixing & Thinning

PAINT APPLICATION REQUIREMENTS

1. Contact Surfaces
2. Temperature Control
   a. Metal Temperature
   b. Room Temperature
   c. Paint Temperature
3. Humidity Control
4. Paint Thickness
5. Paint Damage Repair/Re-coating/Touch-up

APPLICATION METHODS

Spray Application/Manufacturer's Recommendations

1. Air Spray
2. Airless Spray
3. Roller Application
4. Brush Application
5. Coating Thickness

CURING METHODS

1. Air at Room Temperature
2. Heated Bay
3. Other Methods

SHIPPING & HANDLING

Painted items shall be protected:

1. While in Storage
2. In Stocking
3. In Shipping & Handling

TEST PANEL

Each paint shop seeking approval by the State of Iowa shall demonstrate the ability to properly apply shop coats to test panel. Test panels shall be steel (hot-rolled or equivalent) measuring 6 inches by 8 inches or greater, shall be white metal blast-cleaned (SSPC SP5) with a nominal anchor profile between 1.5 to 3.5 mils and coated with zinc-rich paint.

Panels shall be blast-cleaned and coated on both sides and all edges. The paint shall be spray-applied and cured in accordance with manufacturer's recommendations. The dry film thickness shall be between 3.0 and 5.0 mils. Prior to any exposure testing, panels shall be aged for 14 days at 75˚F-79˚F and 45-55% relative humidity.

Mudcracking:

The coating after the cure period shall show no mudcracking to the naked eye and when viewed under 10x magnification.

Adhesion:

The coating when applied and hardened shall adhere to the steel substrate when subjected to testing.

Gloss & Color Retention & Ultraviolet (UV) Resistance Testing:

The paint manufacturer shall present a certificate of compliance by an independent certified laboratory stating that the paint has been tested for gloss and color retention and UV resistance and has met the intended specification requirements.

POWDER COATING SHOP APPROVAL

Each powder coating shop shall be approved prior to the application of any powder coating process. Powder coating shops seeking approval shall provide the Central Materials Office a written application to become an approved powder coater by the State of Iowa. The application shall include the following:

1. Quality control procedures that the company has established to ensure quality and durable coating
2. Qualified / Certified Personnel to manage the QC Program and to conduct Quality Control Tests
3. Source and type of powder
4. Powder storage – controlled environment
5. Sand blasting (Indoor / Outdoor)
6. Surface preparation, Anchor profile(surface profile)
7. Powder application bay (size in sq. ft) – heated or unheated
8. Conveyer line powder application booth
9. Type of pre-treatment on the substrate (number of state treatment and types of chemicals used on the pre-treatment)
10. Curing bays (conventional or infared)
11. cure temperature (250° - 350°F), oven temperature and / or part (substrate) temperature.
12. Hoist (Type and Capacity in tons)
13. Lighting minimum requirement 50-foot candles (lm/ft^2) – high intensity, halide lamps
14. Ventilation systems(capacity in CMF)
15. Humidity / Temperature / Air flow
16. Qualified / Certified painters and / or coaters
17. Powder certification – Manufacturer certification
18. Storage and protection of coated items
19. Shipping & Handling(packing, protecting, and wrapping)
20. Recording procedures – documenting coating process
21. Application methods (electrostatic spray, thermal spray, hot flocking, or hot spray, etc.)

Powder Storage Requirements

Powder shall be stored under dry, cool, clean conditions at a temperature not higher than 77°F (25°C)for not more than one year and / or as recommended by the powder's manufacturer. Approved powder manufacturers are listed in Appendix D.

Surface Preparation

Items to be coated, shall receive an abrasive blast and shall comply with the requirements of SSPC SP7 to achieve a recommended surface profile of (1.5 – 2.5 mils) necessary for satisfactory bonding of the powder to the substrate.

Sweep Blasting / Brush Blasting

Sweep blasting is applied to provide stripping action without removing excess zinc layers. Care must be exercised to leave zinc layers intact. The purpose of sweep blasting is to deform and not to remove the galvanized surfaces. Following the sweep blasting, surfaces shall be blown down with clean, compressed air. Adhesion problems have been experienced with newly galvanized surfaces that have been water quenched or treated with chromate conversion coatings. These two post treatments are not allowed to be used for galvanized surfaces that are to be painted and / or powder coated.

Application Methods

Substrate shall completely be free of grease, oil, dirt, scale, rust, and / or any other contaminants to ensure optimum adhesion and coating performance. Due to wide variety of substrates, surface preparation requirements application methods, the applicator shall be required to evaluate for adhesion, film thickness and compatibility before running full scale operation.

Film Thickness

Unless otherwise specified the film thickness shall have a minimum of 3.0 mils and maximum of 4.0 mils with an average target value of 3.5 mils.

Test Panel

Each powder coating shop seeking approval by the state of Iowa shall demonstrate the ability to properly apply powder coat to a test panel (powder coat applied over galvanized and un-galvanized surface). Test panel shall be steel (hot rolled or equivalent) measured 6-inches by 8-inches or greater.

Recommended steps for powder coating over hot dip galvanizing – for inspectors and coaters

1. Hot dip galvanize and do not water or chromate quench.
2. Remove all surface defects.

3. Keep surface clean and dry. Do not transport un-covered loads. (diesel fumes, dust, moisture will contaminate surface)
4. If surface contamination has occurred or is suspected, clean surface with proprietary solvent / detergent designed for pro-cleaning prior to powder coating.
5. Maximum adhesion is best achieved by using phosphate treatment before powder coating the steel. Note: surface must be entirely clean as this treatment has no cleansing action.
6. Pre-heat the steel prior to coating.
7. Using degassing grade polyester powder only. Anti-blistering agents, such as polyethelene oxide, can be added to the powder to prevent pinholing and promote good adhesion.
8. The powder coating shall be cured by heating the coated specimens to a temperature and duration specified by the powder coat material manufacturer to insure sufficient and adequate curing of the powder coating material. The resulting coating shall be uniform in color and free of pinholes, blisters, sags, runs, cracks, mud-cracking, holidays, and / or any other surface defects. Note: correct cure shall be checked by a solvent rub test.

Repair of Powder Coated Materials

Damage shall be defined as:

A. Exposed Galvanized coating
B. Mud Cracking
C. Deep scratches

Note: Damaged coating less than 1/3 of 1.0% of the surface area, shall be acceptable for repair, damage greater than that amount shall be recoated.

Coating to be repaired shall be touched up as recommended by the powder coating supplier (recommendation for repair shall be in writing).

Touch up and / or field repair can be accomplished using either powder coating material or paint. Typically acrylic based paint as recommended by the powder coating material manufacturer, applied either by spray or brush is used for touch up and repair of the powder coating or whatever the powder manufacturer recommends.

List of Problems with Powder Coating over Galvanizing

The three main problem areas associated with powder coating of hot dip galvanized steel products are:

1. Pin holing of the coating (due to small gas bubbles in the polyester coating during cure cycle)
2. Poor adhesion (it's essential that hot dip galvanized items are not quenched after galvanizing)
3. Incomplete curing of the polyester resin

In order for the polyester powder resins to reach their final cure organic form must be heated at a temperature of 356ºF (180ºC) for at least 10 minutes. Heavier section thickness of hot dip galvanized items may require longer stoving (heating) time to allow for proper cure and to meet the recommended curing specifications. Pre-heating of the heavier, thicker items will assist in accelerating the curing process in the curing ovens or curing bays.

Certification Statement

We hereby certify that the items described herein have been painted / powder coated in accordance with the manufacturer recommendations and the specific requirement to the Iowa Department of Transportation and are in compliance.

Paint and / or powder used on these items are from approved sources.

Signed by_____
Authorized Representative

A copy of this certification shall be mailed at the time of the shipment to the project engineer and the District Materials Engineer.