

General Process Specification for Paint and Pre-treatment

1. General Appearance:

- 1.1. The finish shall provide a color specific protective coating that is smooth, blemish free (Standard colors include ANSI 49 and 61 gray, special colors as required).
- 1.2. ANSI 49 color characteristics (L, a, b)
- 1.3. ANSI 61 color characteristics (L, a, b)

2. Functional Performance:

- 2.1. The coating shall be applied by E-coat, Dry Powder, and/or Liquid spray. Preparation will consist of an alkaline clean, iron and/or zinc phosphating and non chrome sealer). Pre-treatment to the following substrates:
 - 2.2. Hot Rolled Steel, per ASTM A569
 - 2.3. Cold Rolled Steel, per ASTM A366 / A366M-97
 - 2.4. Cold Rolled Steel, per ASTM 620 / A620M-97
 - 2.5. Steel Sheet, per ASTM A568 / A568M-97
 - 2.6. Aluminum, per ASTM B209
 - 2.7. Galvaneal, Steel per ASTM A924, /A924M-97
 - 2.8. Galvanized Steel, per ASTM A653 / A653M-97
 - 2.9. Satin Coat, per ASTM A924, section 1.2.2
 - 2.10. 304 Stainless Steel, per ASTM A167

Pickled in Oil Standard
Commercial Steel
Drawing Steel

3. Specific Characteristics:

- 3.1. Dry film thickness, as required to meet UL, CSA standards, and/or UL DTOV2 Certification for the utilized coating product @ minimum thickness or greater. Coating thickness shall not be applied too thick as to interfere with gap tolerances designed with the structure itself.
- 3.2. Adhesion per ASTM D3359, 100 percent Adhesion.
- 3.3. Gloss 60% +/- 5 @ 60 degrees, per ASTM D-523.
- 3.4. Hardness H-5H per ASTM D3363
- 3.5. Impact 160 in. /lbs., direct impact, no cracking per ASTM 2794. (12 gauge)
- 3.6. Humidity, Industrial 1200 hours per ASTM 2247, Utility 2500 hours per ASTM 2247.
- 3.7. Color ANSI 49
 - 3.7.1. L * = 49.21 +/- 0.4
 - 3.7.2. a * = -3.08 +/- 0.3
 - 3.7.3. b * = -0.45 +/- 0.3
- 3.8. Delta E = maximum 1.00 (NOTE: The metamerism index shall not exceed 0.5 under D65, Cool White Fluorescent or A (Incandescent) illuminants.) per ASTM D2616 / D1729.
- 3.9. Re-coatability 100 percent adhesion required between original paint film and subsequent coats without additional processing. (per ASTM D3359)

- 3.10. Tabor abrasion shall pass 3000 cycles to base metal with CS10 wheel at 100-grain weight for specific product applications.

4. Pre-treatment Characteristics:

- 4.1. Cleaner (UF) Compatible
- 4.2. Low foam
- 4.3. Mild or No chealators
- 4.4. Phosphate must not contain Nickel as a catalyst.

5. Corrosion Resistance:

- 5.1. **General** – The coating shall be applied following UL 1332 (2/9/2005) “Organic Coatings for Steel Enclosures for Outdoor Use Electrical Equipment” guidelines, and evaluated per UL 50E, (9/4/2007) “Enclosures for Electrical Equipment, Environmental Considerations,” or this corporate process specification, which ever is more stringent.

5.1.1. Interior:

- 5.1.1.1. Products that will be installed in locations protected from the weather, direct sunlight, and free from corrosive atmospheres shall meet the following requirements.
- 5.1.1.2. Minimum hours exposure to an ASTM B117 salt spray (fog) of 200 hours, with no more than 1/8” etch-back from a scribed line, equivalent to a rating of five or better as per ASTM D1654, Procedure A.
- 5.1.1.3. Blisters of no more than 1/16” in diameter. No greater concentration than one in any given square inch of product surface or equivalent to a rating eight (2-3 percent area failed) or better as per ASTM 1654, procedure B or a rating of No.6-Few (Photographic reference) or better as per ASTM D714.

5.1.2. Exterior:

- 5.1.2.1. **Commercial/Industrial** products that are installed in locations exposed to the weather, direct sunlight, and / or corrosive atmospheres shall be coated with a UL listed outdoor paint to pass 600 salt spray hours as per ASTM B117 with a rating of five or better using ASTM D1654, Procedure A.
- 5.1.2.2. Blisters of no more than 1/16” in diameter. No greater concentration than one in any given square inch of product surface or equivalent to a rating nine (0-1 percent area failed) or better using ASTM 1654, procedure B or a rating of No.6-Very Few (0-1 per Sq. In.) or better using ASTM D714 (Photographic Reference).

5.1.3. Utility Products:

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5.1.3.1. Utility products shall be coated with a UL listed outdoor paint, to pass 2500 salt spray hours per ASTM B117 with a rating of five or better using ASTM D1654, Procedure A.

5.1.3.2. Blisters of no more than 1/16" in diameter. No greater concentration than one in any given square inch of product surface or a rating of nine (0-1 percent area failed) or better using ASTM 1654, procedure B or a rating of No.6-Very Few (0-1 per Sq. In.) or better using ASTM D714 (Photographic Reference).

5.1.4. Aerosol Products:

5.1.4.1. Aerosol products utilized for touch up painting purposes shall have the following requirements:

5.1.4.2. Low VOCs

5.1.4.3. Gloss 60% +/- 5 @ 60 degrees, per ASTM D-523.

5.1.4.4. Color ANSI 49

5.1.4.4.1. $L^* = 49.21 \pm 0.4$ *Dark / Light*

5.1.4.4.2. $a^* = -3.08 \pm 0.3$ *Green / Red*

5.1.4.4.3. $b^* = -0.45 \pm 0.3$ *Blue / Yellow*

5.1.4.5. delta E = maximum 1.00

5.1.4.6. The metamerism index shall not exceed 0.5 under D65, Cool White Fluorescent or A (Incandescent) illuminants.) per ASTM D2616 / D1729.

6. Health, Safety, and Environmental Considerations:

6.1. All proposed chemicals shall not exceed current facilities' Hazardous Air Pollutants (HAPs), Toxic Air Pollutants (TAPs), and Volatile Organic Compounds (VOCs) under Title V of the Clean Air Act, and in conjunction with each facility's waste treatment system, meet the requirements of the Clean Water Act. Any hazardous waste disposal shall be handled in accordance with Resource Conservation and Recovery Act (RCRA).

7. Definitions:

- 7.1. Blemish: a noticeable imperfection that changes the appearance or completeness of the painted surface, something that it is obvious defective (i.e.: fisheyes, big craters, advanced orange peel, advanced build up on the edges - framing, powder bumps or bubbles, volcanoes, etc.), scratch, and mar resistant.
- 7.2. Fisheyes: Fish Eyes look like little craters on the moon where the paint pulls away from the center. (Looks well, like a fish eye and hence the name). Fish eyes occur immediately upon spraying. Fish eyes are caused by contamination of the surface you are spraying. Water, oil and silicone are the three major culprits.
- 7.3. Craters: Contamination of the substrate (e.g. silicone, grease, wax) causes surface defects. This results in areas where the coating does not form a complete film over the substrate.
- 7.4. Orange Peel: An irregularity in the surface of a paint film resulting from the inability of the wet film to level out after being applied. Orange peel appears as a characteristically uneven or dimpled surface to the eye, but usually feels smooth to the touch
- 7.5. Volcanoes: Is a crater formed due to contamination that has a high accumulation of paint around the crater that looks like a small volcano under magnification.

- 7.6. Build Up: An area on the part where excessive paint has accumulated, this can cause uneven curing and brittleness of the paint.
- 7.7. Framing: an excessive build up of paint forming around the perimeter of the part similar to a picture frame.
- 7.8. Powder Bumps: Contamination in the powder paint that creates bumps or spots in the film from the contamination trapped in the paint film.
- 7.9. Bubbles: Bubbles are the result of trapped air or gas under the paint surface that ruptures or blows through the paint finish. This is also called "off-gassing, and rupture."
- 7.10. Scratches: An actual penetration through the paint surface into the substrate below the paint film.
- 7.11. Scuff or Mar: Is a penetration of the top layer of paint without going through to the lower layer or paint.
- 7.12. Chipping: Removal of finish usually due to the impact of hard objects such as tables, tools, and etc.
- 7.13. Mar Resistance: The resistance of a material to abrasive action. It is measured by abrading a specimen, then measuring the gloss of these abraded spots with a gloss meter and comparing the results with an unabraded area of the specimen.