

Optima EPS Powder Coat Paint Process

This data sheet describes the standard painting practice used at Optima EPS Inc., Lawrenceville, GA facility on our console, enclosure and cabinet products:

- Cabinet Series: R, S, M, F and MS
- Enclosures: E-Case, Outdoor
- Desks & Consoles

The information contained herein is based on Optima's manufacturing and engineering standards.

Procedures

Pretreatment: Before each product is painted, it is prepared by passing it through a 3 stage metal pre-treatment wash that cleans and forms a coat of zirconium phosphate on the metal. This process consists of the following stages;

1. Wash and clean (stage 1)
2. Zirconium coating (stage 2)
3. Rinse and seal (stage 3)

Each closely monitored stage is tested on a daily basis for concentration and Ph, ensuring compliance with the paint supplier's specifications.

Dry-off: The pre-treatment process is followed by a dry-off stage that dries the part and sets it for maximum protection. This results in a surface that is in optimal condition for receiving the protective paint finish.

Painting Application: The protective painting finish, TGIC (triglycidyl isocyanurate) Polyester Powder, is electrostatically applied and then thermally set to a hard, durable coating.

Protective Pain Finish Properties and Specifications

Material: TGIC Polyester Powder (see 900 Series spec. sheet for details)

Powder paints generally outperform other paint technologies. They are tougher, last longer, and are more resistant to abrasion and impact damage.

Powder paints are also considered more environmentally friendly than other paints, emitting virtually zero VOCs (volatile organic compounds). Coating formulated using polyester TGIC resins offer excellent mechanical properties, corrosion protection, and edge coverage. In addition, they are specifically known for excellent indoor and outdoor durability.

The powder paint used at Optima demonstrates all these desirable characteristics. It has exceeded expectations in all applications. **9000 Series TGIC Polyester Systems** have a broad formulating range and can meet many decorative and functional requirements for gloss, physical properties, chemical resistance, color, and weather ability. Products in this series can be used in thick film applications. Typical uses include: aluminum extrusions, playground equipment, agricultural equipment, and machinery.

- The following table compares typical properties of thermosetting powder coatings. Table information is provided by the Powder Coating Institute, Alexandria, VA 22314.

| Property | TGIC-Polyester | Epoxy/Polyester Hybrid | Epoxy | Polyester Urethane | Acrylic Urethane |
|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|---------------------------------|
| Pencil Hardness | HB-2H | HB-2H | HB-5H | HB-3H | HB-3H |
| Direct Impact Resistance* | 80-160 in-lb (48.2-96.4 m*kg) | 80-160 in-lb (48.2-96.4 m*kg) | 80-160 in-lb (48.2-96.4 m*kg) | 80-160 in-lb (48.2-96.4 m*kg) | 20-60 in-lb (12.1-36.2 m*kg) |
| Outdoor Weatherability | Excellent | Poor | Poor | Very Good | Very Good |
| Adhesion | Excellent | Excellent | Excellent | Excellent | Excellent |

*Tested at a coating thickness of 2.0mil.

- The TGIC powder, as formulated for Optima, has the following properties that have been verified by appropriate testing on actual production samples at a nominal film thickness of 2.0-6.0 mils (ASTM D-1186):

| Test | Result |
|-------------------|---|
| Salt Spray | Less than 1/16" undercoating after 1000 hrs of exposure, 1000 hrs of exposure in 5% salt spray at 95 Deg F and 95% relative humidity (ASTM B-117-97). |
| Hardness | H-3H (ASTM D-3363) |
| Adhesion | No lifting of 1/8" squares between scribed lines when cross hatch adhesion is tested using the prescribed tape. (ASTM D-3359) |
| Gloss | 55-65 @ 60 degrees (ASTM D-523) |
| Humidity | 1000 hours minimum (ASTM D-4585) |
| UV Exposure | After 1 year of sun exposure, coatings exhibit a minimal loss of gloss and no deterioration. |
| Impact Resistance | 160 inch-pounds, direct and reverse, at a film thickness of 2 mils. (D-2794-93) |
| Flexibility | A coating of 2 mils or less will withstand a bend of 180 Deg. (D-522-93a) |

- Quality Control

To 1000 hours minimum (ASTM ensure the quality of the paint system, the following tests are periodically performed.

- **Hardness** – The hardness of paint film is considered acceptable when the rating is within the H-5H range, when tested per ASTM D-3363.

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- **Adhesion** – The method used in assessing the adhesion of coating films to metallic substrates is in accordance with ASTM D-3359. Paint adhesion is considered acceptable upon passing of the method B cross-cut tape test, level 5B (no loss of adhesion).
- **Gloss** – Nominal specular gloss value is 55-65 @ 60 degrees, per ASTM D-523.
- **Impact** – No cracking or chipping of paint film upon impact of 160 in-lb (96.4 m*kg) per ASTM D-2794.

- **Salt Spray Resistance** – Painted test panels will withstand a 1000-hour 5% salt spray test, per ASTM B-117. This testing is performed to ensure conformance to this corrosion resistance standard.

- Comparison of Finish Quality

The chart below shows how TGIC Polyester Powder performs against other finishes.

| TGIC Polyester Powder Finish is Superior To the Following Finishes: | | | |
|---|---------------------|-----------------|-------------------|
| Paints | Surface Preparation | | |
| | Iron - Phosphate | Zinc- Phosphate | Galvanealed Steel |
| Air Dry | X | X | X |
| Latex | X | X | X |
| Oil-Based | X | X | X |
| Epoxy (one-part) | X | X | X |
| Epoxy (two-part) | X | X | X |
| Urethane (two-part) | X | X | X |
| Polyester (two-part) | X | X | X |
| Baked Water-Born | X | X | X |
| Baked Enamel | X | X | X |

- Standard Colors:

| Standard Color | Optima Code | Fed-Std | Other |
|----------------|-------------|---------|------------------|
| Black | -1 | 27038 | |
| Sky Blue | -2 | IBM | PANTONE® 8640 |
| White | -3 | | Optima |
| Deep Charcoal | -4 | | Optima |
| Light Gray | -5 | 26440 | |
| Beige | -6 | 26521 | |

- Other Colors Available

Other colors are considered special and are available at extra cost. A color chip must be provided with order entry to assist in the proper mixing of the color. Because color, gloss and texture vary depending on paint type and application

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method, Optima can not be responsible for such variations when matching the color of existing equipment or equipment from other vendors.