TCI Technical Bulletin

“Powder Coating over Cathodic Epoxy Electrocoat”

To ensure inter-coat adhesion between a cathodic epoxy electrocoat and a powder topcoat, you must manage both the physical bond and the chemical compatibility of the two layers.

Critical Success Factors:

- Proper Curing: The E-coat must be fully cured before powder application to ensure a stable base.
- Surface Cleanliness: The surface must be free of oils, dust, or handling marks. Even if the E-coat is fresh, any contamination can cause adhesion issues or surface defects like "holidays".
- Grounding: Because E-coat is an insulating layer, it can slightly weaken the electrostatic attraction for the powder. Professionals often adjust gun settings (lowering micro-amps or increasing flow rate) to overcome this resistance.
- Heat Resistance: Cathodic epoxy is designed to withstand the high temperatures (typically 300°F to 450°F) required to cure powder coatings without degrading.

Optimize the E-Coat Surface

- Correct Curing: The E-coat must be fully cured according to the manufacturer’s specifications before the powder is applied. Under-cured E-coat can outgas during the powder bake, causing bubbles, while over-curing can make the surface too hard and "slick" for the powder to grip.
- Mechanical Abrasion (Scuffing): For maximum adhesion, especially on parts that have sat for more than 24 hours, lightly scuff the E-coat surface with a fine abrasive pad (like a maroon Scritch-Brite) or 400-grit sandpaper. This creates a "profile" that allows the powder to mechanically interlock with the base layer.

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Cleanliness: Even invisible contaminants like skin oils or silicone overspray can cause "fish eyes" or peeling. Clean the E-coat with a specialized wax and grease remover or a waterborne cleaner before powder coating.

Verification Testing

- Before committing to a full production run, perform an adhesion test to verify the system:
- Cross-Hatch Test (ASTM D3359): Cut a grid through both layers down to the metal, apply specialized tape, and pull it off quickly. If the powder peels away from the E-coat, your intercoat adhesion is insufficient.
- Pull-Off Test (ASTM D4541): Use a hydraulic adhesion tester to measure the exact force required to pull the coating off the substrate.

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