

Tgic Polyester Powder Coat Resin – Technical Material Specification

1.0 Material Overview & Common Uses

TGIC (Triglycidyl Isocyanurate) Polyester Powder Coat Resin is a thermosetting polymer system used extensively in industrial powder coating applications. It consists of a carboxyl-functional polyester resin cross-linked with TGIC hardener, forming a durable, weather-resistant, and chemically stable coating upon curing. This material is the industry standard for exterior-grade powder coatings due to its excellent UV resistance, gloss retention, and mechanical toughness.

Common applications include architectural aluminum extrusions, automotive wheels and trim, outdoor furniture, agricultural equipment, HVAC components, and general metal fabrication requiring long-term outdoor exposure. TGIC polyester systems are typically applied via electrostatic spray deposition (ESD) and cured in convection ovens at elevated temperatures.

2.0 Core Technical Properties & Sizing

- Density: 1.4–1.6 g/cm³ (typical for formulated powder; varies with pigment and filler loading)
- Glass transition temperature (T_g): 55–65°C (uncured powder); cured film T_g: 70–85°C
- Particle size distribution: D50 = 25–45 µm (standard grade); D10 ≥ 10 µm, D90 ≤ 90 µm
- Gel time at 200°C: 60–120 seconds (per ISO 8130-6)
- Cure schedule: 10–15 minutes at 200°C (metal temperature); 15–20 minutes at 180°C
- Theoretical coverage: 10–12 m²/kg at 60 µm film thickness (typical)
- Storage stability: 12 months from date of manufacture when stored below 30°C
- Standard packaging: 20 kg sealed polyethylene-lined cardboard boxes or 500 kg supersacks

3.0 Processing, Machinability & Application

TGIC polyester powder is applied using electrostatic spray guns (corona or tribo charging) at 30–80 kV. The powder is fluidized in a hopper and conveyed to the gun via compressed air. Substrates must be clean, degreased, and pretreated (iron phosphate, zinc phosphate, or chromate conversion) for optimal adhesion and corrosion resistance.

- Recommended film thickness: 50–80 µm (single coat); 100–150 µm for heavy-duty applications
- Curing oven temperature: 180–200°C (metal temperature); ramp rate ≤ 20°C/min to avoid blistering
- Gun-to-part distance: 150–250 mm; fluidization air pressure: 0.5–1.5 bar
- Reclaim powder: up to 30% virgin blend acceptable; sieve through 100 µm mesh before reuse
- Do not exceed 220°C metal temperature – thermal degradation and yellowing may occur
- Post-cure cooling: air cool to below 60°C before handling to prevent deformation

4.0 Common Defects & Quality Control

- Reject if gel time deviates more than ±15% from supplier specification (per ISO 8130-6)
- Reject if particle size D50 is outside 25–45 µm range – causes poor fluidization or orange peel
- Reject if moisture content exceeds 0.5% (Karl Fischer titration) – causes pinholing and outgassing

- Reject if cured film exhibits craters, pinholes, or blisters > 0.5 mm diameter per 100 cm²
- Reject if gloss variation exceeds ±5 units from standard at 60° angle (per ASTM D523)
- Reject if impact resistance (direct) is less than 40 in-lb (ASTM D2794) – indicates undercure
- Reject if cross-hatch adhesion test shows > 5% removal (per ASTM D3359)
- Reject if MEK double rubs (ASTM D5402) show film removal before 50 rubs – indicates undercure

5.0 Storage, Handling & WHMIS Guidelines

- Store in original sealed containers in a cool, dry area below 30°C and below 60% relative humidity
- Shelf life: 12 months from manufacture date; use FIFO rotation; discard any powder that has caked or hardened
- Avoid exposure to direct sunlight, heat sources, and open flames – powder is combustible in dust cloud form
- WHMIS hazard classification: Combustible Dust (Hazards not otherwise classified); TGIC component is toxic if ingested or inhaled
- Mandatory PPE: NIOSH-approved N95 respirator (or half-mask with P100 filter) during handling and spraying; safety glasses; anti-static clothing; nitrile gloves
- Use explosion-proof electrical equipment in spray booth and storage areas; ground all equipment to prevent static discharge
- In case of skin contact, wash with cool water and mild soap; do not use solvents. For eye contact, flush with water for 15 minutes and seek medical attention
- Spill cleanup: use HEPA-filtered vacuum or wet sweeping; do not use compressed air. Dispose as non-hazardous waste per local regulations (cured material is inert)

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