

ALUMINUM POWDER COATING PROCESS



WHAT IS POWDER COATING?

Powder coating is a dry finishing process used to coat a metal substrate. It utilizes a polymer resin system combined with curatives, pigments, leveling agents, flow modifiers and other additives. These ingredients are melted, mixed, cooled and ground into a powder similar in consistency to baking flour.

Once the metal part that is being coated completes a multi-step cleaning and rinse process, it enters a powder coating chamber where a process called electrostatic spray deposition (ESD) is used to apply the powder coating to the metal. This application process uses multiple spray guns to apply an electrostatic charge to the powder particles which are then attracted to the grounded metal part.

After the powder is applied, the parts enter a curing oven where the heat creates a chemical reaction that produces long molecular chains in the coating — permanently adhering the coating to the part. The end result is a finish that is similar to liquid paint, but one that is extremely durable.

Powder coating is used for many different applications — from products like children's toys and office furniture — to automobiles, heavy machinery and the aluminum products that are manufactured at Barrette Outdoor Living.

What makes powder coating an environmentally friendly process?

Since powder coating does not use solvents or chemicals like liquid paints, the process releases less pollutants into the air and leaves a smaller carbon footprint.

Through the ability to reclaim and reuse over-sprayed material — unlike excess liquid paint that needs to be disposed — the powder coating process generates no hazardous waste. Powder coating reduces CO2 emissions by up to 60% compared to liquid paint.

POWDER COATING AT BARRETTE OUTDOOR LIVING

At Barrette Outdoor Living, our powder coating equipment was engineered and built just for us. Designed specifically to coat aluminum products, our powder coating equipment is located on-site in our manufacturing facilities and is operated by highly trained and qualified staff.

Because we do not outsource our powder coating, there is no chance of being bumped “off the line” for another manufacturer and we can easily increase production to keep up with demand.

Barrette Outdoor Living worked closely with a leading powder manufacturer to create a proprietary powder formulation that is designed to meet our high-level specifications. Our target range for powder thickness on all aluminum parts is 3 to 4 mils — one of the highest coatings in the industry.

Barrette Outdoor Living also uses a fully automated powder coating process that is designed to maintain the purity of the parts being coated. Our aluminum parts are not touched by human hands once they are loaded onto the conveyor belt and begin the pretreatment process.



WHAT DOES IT MEAN TO BE AAMA 2604 SPECIFIED?

The American Architectural Manufacturing Association (AAMA) creates specifications for architectural powder coatings. AAMA offers three levels of specification — 2603, 2604 and 2605.

AAMA 2603 typically is used for interior specification where color retention is not required. AAMA 2605 is reserved for high performance exterior specification for architectural projects that require long term cosmetic and functional protection.

AAMA 2604 specifies that the coating is designed for superior corrosion resistance outdoors with limited fade and weathering. AAMA 2604 coatings are formulated with super durable polyester resins which provide good color and gloss retention.

Barrette Outdoor Living’s aluminum products feature a powder coating that meets and exceeds AAMA 2604 specifications. We exceed by three times the typical requirement for both our process and our powder.

By comparison, the majority of fencing manufacturers only achieve AAMA 2603 specification.



AAMA SPECIFICATION COMPARISON CHART FOR SPRAY COATING ON EXTRUSIONS

| PERFORMANCE TEST | | AAMA 2603 | AAMA 2604 | AAMA 2605 |
|------------------|---------------------------|---|---|---|
| ADHESION | Dry Film Hardness | No coating rupture | No coating rupture | No coating rupture |
| | Dry Adhesion | 10% coating removal | No coating removal | No coating removal |
| | Wet Adhesion | 10% coating removal | No coating removal | No coating removal |
| | Boiling Water Adhesion | Not applicable | No coating removal | No coating removal |
| | Impact Resistance | No coating removal | No coating removal | No coating removal |
| | Abrasion Resistance | Not applicable | ACV 20 minimum | ACV 40 minimum |
| CHEMICAL | Muriatic Acid Resistance | No blistering, no visual change | No blistering, no visual change | No blistering, no visual change |
| | Mortar Resistance | No loss of film adhesion or visual change | No loss of film adhesion or visual change | No loss of film adhesion or visual change |
| | Nitric Acid Resistance | Not applicable | Color change Delta E < 5 | Color change Delta E < 5 |
| | Detergent Resistance | No loss of adhesion | No loss of adhesion | No loss of adhesion |
| | Window Cleaner Resistance | Not applicable | No blistering or change in appearance | No blistering or change in appearance |
| WEATHER | Humidity Resistance | 1,500 hours formation of blisters Size No. 8 | 3,000 hours formation of blisters Size No. 8 | 4,000 hours formation of blisters Size No. 8 |
| | Salt Spray Resistance | 1,500 hours 1-2mm creepage, formation of blisters Size No. 8 | 3,000 hours 1-2mm creepage, formation of blisters Size No. 8 | 4,000 hours 1-2mm creepage, formation of blisters Size No. 8 |
| | Erosion Resistance | Not applicable | 10% loss max | 10% loss max |
| UV EXPOSURE | 45° Florida Exposure | 1 year | 5 years | 10 years |
| | Color Retention | Not applicable | Color change Delta E < 5 | Color change Delta E < 5 |
| | Chalk Resistance | Not applicable | No more than No. 8 rating | No more than No. 8 rating for colors and No. 6 for whites |
| | Glass Retention | Not applicable | Minimum 30% | Minimum 50% |

Quality control is the hallmark of Barrette Outdoor Living's entire powder coating process — from the variety of testing performed at our on-site laboratory, to our innovative equipment designed just for products, to the high quality of our proprietary powder formulation — quality is always at the forefront of what we do.

BARRETTE OUTDOOR LIVING'S ALUMINUM POWDER COATING PROCESS

Barrette Outdoor Living's Powder Coating Process features a multi-step pretreatment process and a coating and curing process.

Pretreatment process

- Raw aluminum parts are inspected and positioned (by a combination of automation and hand labor) onto a moving overhead conveyor belt that moves the product through the powder coating process. From this point on, the powder coating process is completely automated.
- Parts loaded onto the belt enter system and are cleaned with an alkaline cleaner to remove impurities.
- Parts are rinsed with clean city water.
- Parts are cleaned with a reverse osmosis rinse.
- Parts are cleaned with a reverse osmosis water rinse that uses ultra-filtered water.
- Parts are pretreated with a special conversion coating.
- Parts are rinsed again with an ultra-filtered reverse osmosis water rinse.

Coating and curing process

- After the Pretreatment Process is completed, parts then move into a convection oven that evaporates any remaining moisture.
- Barrette Outdoor Living's proprietary powder formulation is then applied by computer application equipment in a secured room where environmental elements like temperature and humidity are tightly controlled to ensure consistent application. The powder adheres to the parts by the addition of an electrostatic charge which creates a magnetic attraction between the particles in the powder and the aluminum part.
- The aluminum part then moves into the curing oven where the powder begins to gel as its molecules bind together to form an outer shell that then permanently adheres to the aluminum. Curing ensures a durable finish that won't scratch, chip, corrode or fade as easily as other finishes.

Our target range
for powder
thickness on
all aluminum parts
is 3 to 4 mils —
one of the highest
coatings in the
industry.

SYSTEM CHECKS

To ensure consistency and quality in our powder coating process, Barrette Outdoor Living created an internal laboratory to conduct regular system checks. These checks include:

- **Automated titration test:** Our titration test checks the Ph balance of the pretreatment chemicals. Because Barrette Outdoor Living's titration process is fully automated, testing is constant and occurs throughout each production shift.
- **Cure oven temperature test:** During the curing stage, oven air temperatures are monitored by a data pack with heat sensors that moves through the oven and records temperature variances. Staff evaluate the data collected to ensure a consistent temperature profile is being maintained throughout the curing process.
- **Powder coating thickness and crosshatch testing:** The target range for powder thickness on parts coated at Barrette Outdoor Living is 3 to 4 mils. Crosshatch testing is done several times each shift to check the adhesion of the powder on the aluminum parts.
- **MEK rub test:** The MEK Rub Test is a manual test conducted several times a day to make sure the cure is complete.
- **Salt spray test:** Barrette Outdoor Living salt spray testing is a continuous process. At any given time multiple samples are being tested to ensure conformity to AAMA 2604 3,000-hour specifications and beyond. Barrette Outdoor Living products consistently demonstrate they exceed the industry standard specifications by 3 times.