White Paper - Guide to Powder Coatings For AAMA 2604

& AAMA 2605 Applications

This document will point out the advantages of using powder coatings for AAMA 2604 & 2605 specified jobs. It is presented as a summary to Gordon Inc.'s white paper "*Powder Coatings for AAMA 2604 and AAMA 2605 Applications*" and will focus on tactical points as they relate to architects, general contractors, and building owners. It is recommended that they be encouraged to read the white paper, as well, for educational purposes and supporting data related to the specifications and how Gordon Inc. ensures quality in its processes.

There is a two-step advantage in specifying Gordon Inc.-applied powder coatings that could be promoted. The first advantage is the powder vs. liquid case in which all of the line-by-line points can be analyzed; this will be shown later. The other case that should be presented is that Gordon Inc. has a distinct advantage over its competition in that it has in-house powder coating capability. This is facilitated by a brand-new, state-of-the-art coating line accompanied by a well-equipped laboratory, that is supported by dedicated staff including a coatings industry expert and a Chemical Engineer. This level of capability is rarely seen at custom coating companies, let alone OEMs, and Gordon Inc.'s competitors are solely dependent on out-sourcing their coating needs.

The main focus of comparing architectural liquid coatings versus powder is in the area of sustainability in that liquid coatings must utilize hazardous chemical compounds in their application. Liquid coatings require hexavalent chromium in their pretreatment to facilitate compliant corrosion resistance. In addition to this, they also require a primer coat that contains chromium. Furthermore, these solvent-borne liquid coatings contain high levels of volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) as defined by Section 112 of the Clean Air Act Amendments of 1990. In most cases VOC content exceeds 5.0 pounds per gallon, which is excessive considering other types of (high-solids) liquid paint are in the 2.0 pound per gallon range. Powder coatings, on the other hand, do not contain any heavy metals, such as Chromium, nor do they contain VOCs or HAPs.

Powder coatings are also a more economical choice. Total costs associated with liquid coating are 89% more than powder coating. This number was calculated by the PCI and is based on numerous case studies that were conducted over several years. In this number are material costs, energy costs, and associated (labor, overhead, and expense) costs. Material costs can be as much as 60% greater for AAMA 2604 liquid coatings and 20% for AAMA 2605. Energy costs associated with liquid coating are 39.6% more than powder coating. This is due to the extra ventilation, air turns needed to manage the solvent fumes associated with a low-solids paint, and operation of thermal oxidation equipment to manage VOC emissions. Associated costs are more 100% more with liquid with the largest contributor being hazardous waste disposal.

Considering the effort and expense of managing hazardous by-products of liquid coating, this process still puts many tons of VOCs and HAPs (per applicator) into the air every year. The environmental impact of this is significant in many ways. The consumption of energy resources and the polluting of our air and water should be reason enough to avoid the use of liquid coatings when there is clearly a cleaner alternative like powder coating. So why do we still use coating materials that are so obviously bad?

The short answer is that people are slow to change. Liquid coatings have been around longer, and as such, have been written into more specifications. Before awareness of their dangers was known, they did serve the markets well with their performance and versatility. Now that there is a much better option, it is imperative to fully utilize that option. Powder coatings have been proven to perform to the AAMA specification and do so without the negative health and environmental impact.

The following table illustrates the comparison between powder coatings and liquid coatings as it pertains to the AAMA specifications and other important criteria:

Criterion	Powder 2604	Liquid 2604	Powder 2605	Liquid 2605
Appearance • **Colors** • **Gloss Range** • **Textures** • **Smoothness**	Solids/Metallic 5-90 Yes 5-8	Solids/Metallic 5-35 Yes 5-8	Solids/Metallic 20-65 Yes 5-8	Solids/Metallic[1] 20-35 Yes 5-8
Pretreatment	5 stage Cr-free, dried-in-place coating	5-7 stage, Hexavalent Chrome	5 stage Cr-free, dried-in-place coating	5-7 stage, Hexavalent Chrome
Film thickness(mils) • **Primer** • **Color** • **Total**	Not required 2.0 min. 2.0 min.	0.2-0.4 1.0-1.3 1.2-1.7	Not required[2] 2.0 min. 2.0 min.	0.2-0.4 0.8-1.0 1.0-1.4
Mechanical Properties • **Impact** • **Pencil Hard** • **Adhesion** • **Falling Sand**	3 mm 3H	3 mm F-H	3 mm 3H-4H	3 mm F-H

• **Taber Abrasion[3]**	5B 30 l/mil 100 mg	5B 30 l/mil 140 mg	5B 40 l/mil 100 mg	5B 40 l/mil 140 mg
Weathering (South FL) • **Duration** • **Color Retention** • **Gloss Retention** • **Chalk Resistance** • **Film Erosion**	5 Years ΔE ≤ 5.0 units ≥ 50% ≥ Number 6 rating Less than 10%	5 Years ΔE ≤ 5.0 units ≥ 50% ≥ Number 6 rating Less than 10%	10 Years ΔE ≤ 5.0 units ≥ 50% ≥ Number 6 rating Less than 10%	10 Years ΔE ≤ 5.0 units ≥ 50% ≥ Number 6 rating Less than 10%
Acid Resistance	Good	Fair	Excellent	Good
Alkaline Resistance	Good	Good	Excellent	Excellent
Criterion	**Powder 2604**	**Liquid 2604**	**Powder 2605**	**Liquid 2605**
Cure Requirements	10 min @ 400° F	10 min @ 450° F	10 min @ 400° F	10 min @ 450° F
VOC • **Primer[4]** • **Topcoat**	N/A Virtually Zero	5.04 lbs./gal 5.4 lbs./gal	N/A Virtually Zero	5.04 lbs./gal 5.5 lbs./gal
HAPs • **Primer[4]** • **Topcoat**	N/A Virtually Zero	5.11 lbs./gal 8.45 lbs./gal	N/A Virtually Zero	5.11 lbs./gal 3.7 lbs./gal
Cradle-to-cradle	Yes	No[5]	Yes	No
LEEDS credits available	Yes	No	Yes	No

[1] Liquid coating can utilize more metallic/mica pigments by weight than do powder coating. This allows the development of a richer metallic effect.

[2] For severe duty, such as coastal or highly corrosive environments, a primer may be applied to substrate.

[3] Taber abrasion results are displayed as coating loss in milligrams per 1000 cycles of abrasion exposure.

[4] Architectural liquid primer contains Chromium.

[5] Cradle-to-cradle certifications are available on polyester-based, AAMA 2604 liquid coatings, if Cr-free primers are used.

Both liquid and powder coatings pass the AAMA 2604 and AAMA 2605 requirements. There are a few areas where the two coatings differ in appearance and performance capability. Powder coatings offer a wider gloss range as well as textured finishes a compared to liquid coatings. Alternatively, liquid coatings can achieve richer metallic finishes due to their ability to hold more special-effect pigment due to their liquid state of phase.

Liquid coatings for architectural performance are based on thermoplastic resins in contrast to powder coatings which are thermosetting. This difference gives powder coating a definite advantage on film hardness and scratch resistance, without sacrificing flexibility.

Architects can benefit greatly by using powder coatings on a project. The economical aspect is typically easier on budgets as powder coatings are less expensive on an equal basis when compared to liquid. Green Building Council also favors powder coating over liquid coating and awards LEED credits on this basis. Some projects are now issuing prerequisite requirements on VOCs and HAPs which exclude the use of liquid coatings.

For general contractors there is a benefit from powder coating as fewer parts will require touch-up painting as a result of handling and installation. This is due to their “toughness” as a result of being thermosetting. This saves time and money during construction as well as change orders for part replacement due to irreparable damage.

Building owners can benefit from all of these benefits from using powder coating. LEED credits are surely a value-added benefit for any project as it results in instant recognition for the building, faster lease-up rates, higher resale value, healthier indoor space, lower use of resources, and is better for building’s occupants, the community and the environment.

In summary, it is beneficial on many levels for powder coatings to be specified and used on architectural work where AAMA 2604 and AAMA 2605 requirements are present. As VOC and HAP regulations become more and more stringent, architects and general contractors, alike, will want to have powder coatings specified to win bids for work, especially on municipal projects. Using Gordon, Inc. powder coated metal, increases the benefit due to the strong capabilities, quality of product, and efficient lead-times that our coating facilities can deliver.

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