

Coatings Specifications for Shelving and Racking Systems:

What You Need to Know to Keep the Supply Chain Flowing



Keeping the supply chain flowing is a full-time job. As the demand for direct-to-consumer shipping has soared in the wake of COVID-19, the need for warehousing infrastructure to support this development has become even more vital to the growing number of companies that provide such services.

One important and commonly overlooked component of that warehousing infrastructure is coatings. As more companies ship goods directly to consumers—and as more warehouses and fulfillment centers turn to robotics and automation to increase the efficiency of their operations—it is more critical than ever that shelving and racking manufacturers select coatings that will stand up to the daily wear-and-tear of servicing and managing their inventories.

In a performance environment that literally translates time into money, the use of shelving and racking systems that require constant maintenance is both costly and inconvenient. Unfortunately, due to the accelerated boon in direct-to-consumer shipping, virtually none of the standard coatings specifications established and commonly referenced in other industries exist for shelving and racking manufacturers.

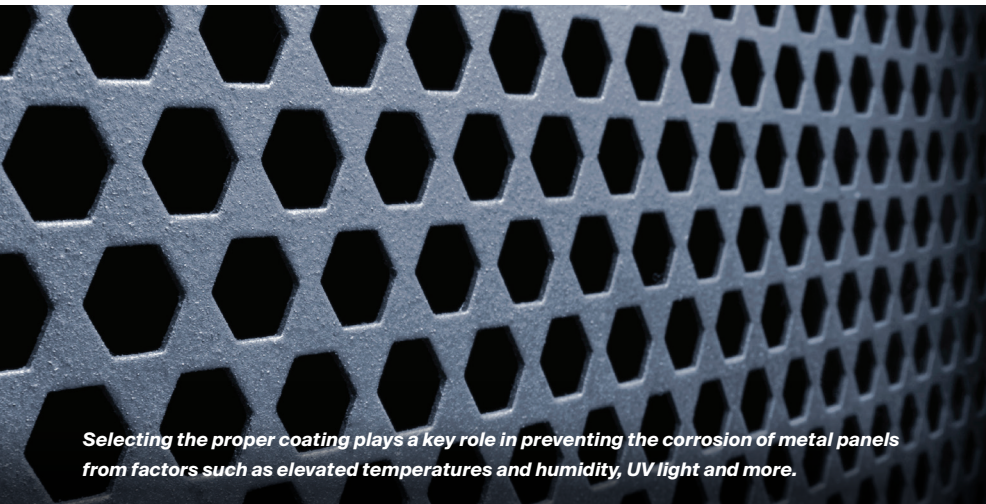
The good news, however, is that most performance demands for industrial coatings are universal. That means, by understanding a few general concepts related to paint types, substrate protection, color and finish, shelving and racking manufacturers can readily acquire the information they need to specify the best paint system for their products.



A Coatings Primer

Step One: Corrosion Prevention

Selecting the right coating system incorporating the latest performance technologies—including new formulations featuring high transfer efficiency and extreme edge protection to deliver superior coverage of intricate parts, sharp edges and complex shapes—enables warehouse racking system manufacturers to produce products that outperform the competition. Shelving and racking systems that require less field maintenance significantly reduce the total cost of product storage, management and shipping as well as the overall cost of equipment ownership.



Selecting the proper coating plays a key role in preventing the corrosion of metal panels from factors such as elevated temperatures and humidity, UV light and more.

Considering the main causes of corrosion and how it affects the total cost of warehouse racking equipment is the first line of defense in providing an extended service life for your product line.

Metal components corrode for any number of reasons. They can include the intersection of two metals with different corrosion thresholds, or factors such as continuous or repeated exposure to elevated temperatures and humidity, damaging pH (acid) levels, electrolytes, chemicals and ultraviolet (UV) light (sunlight).

The most effective way to select the right coatings for metal shelves and racking is a total system approach that considers and accounts for the following variables:

1. The composition of the metal substrate (cold-rolled steel, hot-rolled steel, stainless steel, galvanized metal, mixed-metal, etc.);
2. The types of lubes and coolants used to fabricate the equipment;
3. The materials selected to pretreat the metal substrate (zinc-, iron- or zirconium-based pretreatments);
4. The type of finish coat, including film build (coating thickness) and cure (baking time and temperature) requirements.



Single-coat powder coatings deliver transfer efficiency rates of up to 85% for reduced labor, material and utilities costs, as well as less waste and clean up.

Next Generation Coatings for Shelving and Racking Components

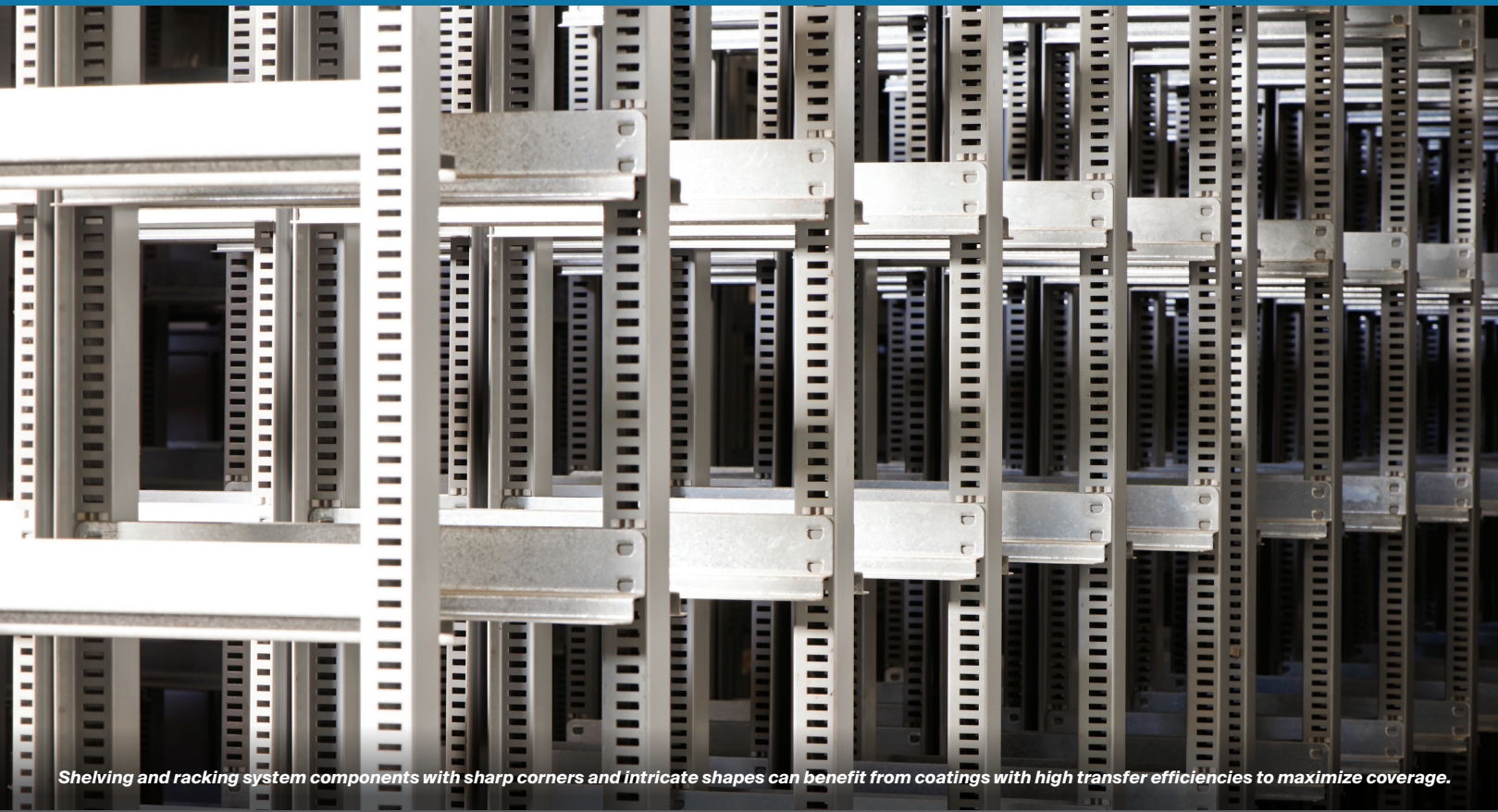
Shelving and racking components are notoriously difficult to paint. In addition to encompassing hard-to-coat shapes such as wire shelving and baskets, they can also generate a significant amount of waste due to high volumes of excess paint. Now there's a solution for each challenge.

PPG ENVIROCRON® HTE coatings incorporate next-generation, single-coat powder coatings technology that generates transfer efficiency rates of up to 85%, improved wrapping of complex parts and enhanced control over the film thicknesses applied to those parts. Meanwhile, PPG ENVIROCRON™ Extreme Protection Edge powder coatings deliver superior protection for sharp edges, recessed shapes and hard-to-cover features with a single coat and first-pass transfer efficiency.

Together, these high transfer and high edge coatings combine to provide enhanced protection and cost-saving benefits specific to this exclusive coatings technology, including:

- Reduced labor, material and utilities costs due to less waste and elimination of a primer coat
- Fewer rejected parts and less demand for touch-up
- Exceptional quality with lower paint thicknesses/volume

The advanced formulation of PPG Envirocron HTE coatings also enable them to provide exceptional color uniformity across the entirety of a coated part, including flat surfaces, sharp edges and rounded curves.



Shelving and racking system components with sharp corners and intricate shapes can benefit from coatings with high transfer efficiencies to maximize coverage.

Design Considerations

Another important criterion for selecting the right coating chemistry is the design of the finished parts. For instance, shelves and racking system components with sharp corners, recessed areas or intricate shapes can be finished with coatings such as PPG *Envirocron* Extreme Protection Edge that safeguard against edge corrosion and are formulated with high transfer efficiencies to maximize coverage on these types of parts while saving time, money and labor.

Coatings manufacturers offer a variety of resin chemistries to improve resistance to corrosion and UV exposure, including epoxies, polyesters, urethanes and acrylics, as well as hybrid coatings, which incorporate a combination of resin chemistries. Each have their strengths and weaknesses.

For instance, epoxies are ideal for chemical resistance and mechanical properties, but are lacking in UV resistance and weatherability. Polyesters, urethanes and acrylics all offer exceptional weathering characteristics, but each offers a different benefit, such as great physical properties for polyesters; chip, scuff and mar resistance for urethanes; and superior surface appearance for acrylics.

Typical solutions for shelving and racking applications include two-coat systems featuring a primer coat for corrosion protection and topcoat for color, appearance and UV resistance. Other popular options include one-coat hybrid systems that combine a mixture of resin chemistries to provide an optimal balance of corrosion protection and UV resistance.

Building a great paint specification is critical to ensuring that shelving and racking system manufacturers are capitalizing on the latest technology available to maximize the service life of their products.

Industry manufacturers seeking to build next-generation components that exceed performance mandates while protecting their brand reputations should review and update their paint specifications regularly to ensure that they address the following criteria:

- **Scope of the product**

This section defines the products covered.

- **Substrate type**

This section details all the metals and non-metal substrates incorporated into an electrical component or enclosure, including aluminum, cold-rolled steel, hot-rolled steel and others.

- **Paint type**

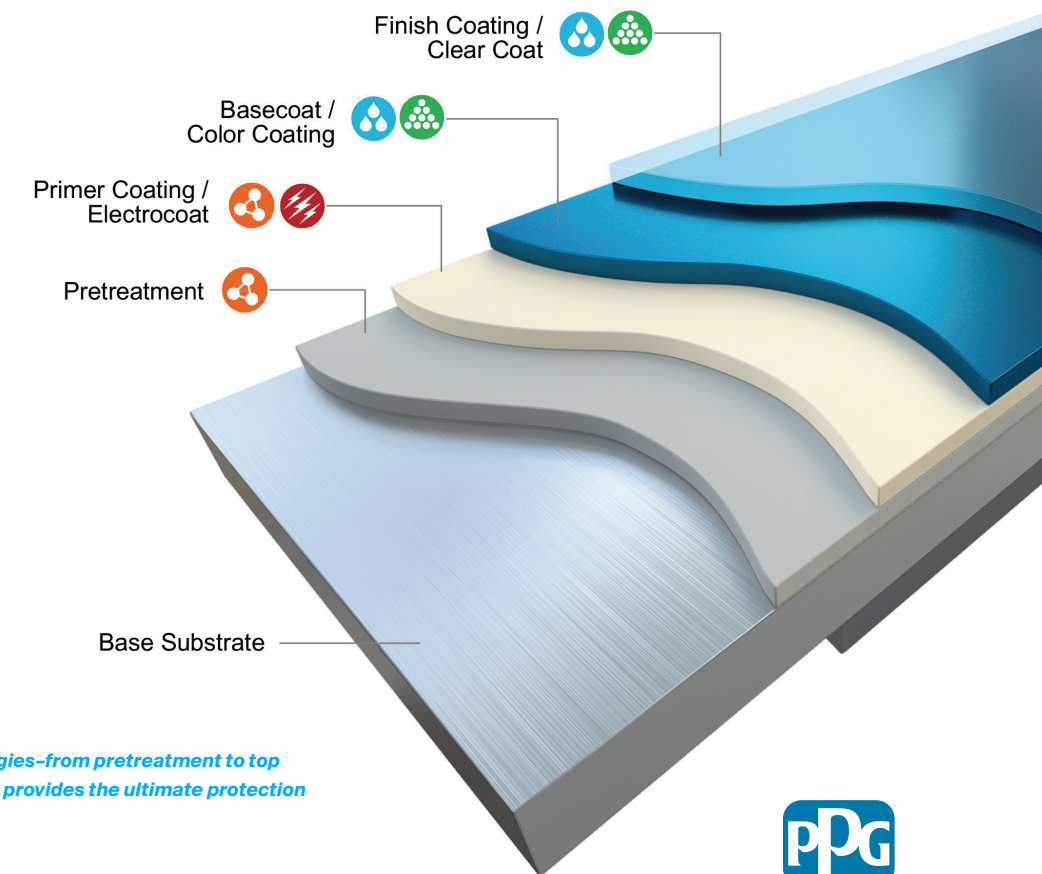
When declaring the type of paint to be used in a specification, shelving and racking system manufacturers should avoid using a specific paint manufacturer's product code. Codes can be ambiguous or difficult to find, as they often change or may be unique to a specific customer.

Instead, detail the specific coatings technology the equipment demands (liquid, powder or electrocoat); then detail the resin chemistry of the desired coating (i.e., TGIC polyester, epoxy, urethane, etc.)

- **Substrate preparation and protection**

This section spells out substrate preparation details and methods. In addition to addressing the cleaning and removal of oils, lubes and coolants left over from the fabrication process, the specification also should spell out chemical cleaning methods using alkaline, acid or solvent-based products; and mechanical cleaning methods such as shot-blasting.

The Building Blocks of a Paint Specification



PPG provides a wide range of coating technologies—from pretreatment to top coats—to create a complex layered system that provides the ultimate protection for your product.



- **Color**

Establishing and maintaining a standard color can be challenging. It is important to detail an acceptable range of color variation and to have a proven and consistent method for determining that the color of a painted part falls within specification.

Pantone, RAL, Munsell and ANSI are color-cataloging systems commonly used for these purposes, although many larger industrial product manufacturers choose to create their own in-house standards. Maintaining color standards is a topic worthy of its own article, so it is best to work with a reputable paint manufacturer to understand the intricacies of creating a color standard and how to detail its parameters in the specification.

- **Gloss**

Like the color spec, the gloss range spec can have a big impact on a product's finished appearance. It is important to provide a specific gloss range in a paint specification, as variations in gloss can cause the same color on a piece of equipment to appear as different shades.

- **Texture**

This section defines the smoothness of the finish. In the shelving and racking industry, limited "orange peel" (minor paint dimpling) may be

considered preferable, as it tends to hide flaws and to wear well over time. Even so, manufacturers should write firm rules for texture types and variation into the paint spec.

- **Cure**

This section establishes paint curing parameters for oven or air-drying paint.

- **Product handling and storage**

Manufacturers suggest specific rules for handling and storage in their product data sheets, including an acceptable range of temperature exposures and fixed expiration dates to ensure proper inventory rotation.

- **Performance**

Coatings manufacturers can formulate coatings to provide a variety of benefits that are critical for specific customer applications. For instance, anti-bacterial coatings for food and beverage, hospital or pharmaceutical applications can provide an added level of hygiene. For specific applications, manufacturers can also specify coatings formulated for anti-skid performance, extended UV resistance, advanced edge protection and coverage, or single coatings solutions for shelving and racking systems incorporating multiple substrates (steel and plastic, for instance).

When creating a paint specification for shelving and racking systems, it is critical to gauge potential component performance using industry-standard test methodologies that most rigorously replicate the performance challenges that products will encounter in real-world environments. Not only does this help ensure that a product will perform reliably throughout its lifetime, it may also lessen maintenance requirements for those products during their service lives as well.

Once a manufacturer has written a paint specification for its shelving and racking systems, it should re-evaluate the document on a regular basis to ensure it incorporates the most targeted and technologically advanced coating systems and testing methodologies.

To ensure optimum results, industry manufacturers should also consider teaming up with paint and pretreatment suppliers in the spec-writing process wherever possible, ideally with a proven coatings company that can offer both pretreatment and paint capabilities as an integrated, single-source coatings solution.

Integrated, full-service coatings suppliers typically have a deep understanding of the coatings

process from start to finish, along with a wide range of products and resin chemistries that have been assessed according to industry-standard criteria.

They also can act as a partner in identifying potential vulnerabilities to corrosion and other coatings failures and can help customers to select the right products to prevent them. Most integrated coatings suppliers also have dedicated lab resources, which enable them to recommend the best test methodologies to measure a product's potential service life. They also have complete testing services to verify lab results, identify potential reasons for a product failure, suggest potential solutions to correct a failure and to troubleshoot general coatings-related production problems.

Summary and Suggestions



Paint and pretreatment suppliers support industry manufacturers throughout the entire spec-writing process and work as a partner in identifying potential vulnerabilities to corrosion.





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