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Ask Joe Powder

Mending Fences

Q Hi Joe:

I was researching online and came across one of your articles from 2014, titled "Don't Blame the Powder" (www.powdercoatedtough.com/News/ID/208/Dont-Blame-the-Powder). I am from Adelaide, South Australia, and was wondering if you can help me.

I am growing increasingly concerned of the spread of rust and blistering that is happening so rapidly to our powder coated steel fence. I am no expert on steel fencing, but I know that it is vital that steel should go through the proper pretreatment process prior to powder coating to maintain longevity of the powder coated finish.

We do not live near the beach or in an industrial area. We also live on a street with only local traffic. In addition, we have many powder coated exterior products, like an outdoor verandah, roofing, gutters, shed and rain water tank that show no signs of rust and have the same life span as the fence. Therefore, I question whether the climate has caused so much rust so soon or whether the supplier did not include pretreatment at all to save costs.

The fence cost approximately \$13,000 and we believed that we were purchasing a durable, long-lasting fence. Now we have the issue of rust in so many areas of the fence

only after 8 years and this is not acceptable. The product we have purchased does not meet the basic levels of quality for the price. We have contacted the supplier and they have not been helpful. The fence is out of warranty so they obviously don't care. Are you able to provide me any advice? Please see images attached. I look forward to hearing from you.

Kind regards,
Diana T., Adelaide, South Australia



Figure 1. Corrosion Around Weld Areas of Steel Fence Structure



Figure 2. Steel Fence Location and Environment

A Hi Diana,

Thank you for your message. I can see why you are unhappy with the performance of the finish on your steel fencing. The pictures help a lot in diagnosing your problem. It appears that, indeed, there is a problem with the pretreatment of the metal. It does, however, look as if the coater used pretreatment because much of the finished surfaces looks decent at this point in time. The corrosion sites seem to be concentrated on weld areas. Weld areas require more aggressive pretreatment than mild steel. Otherwise, the coating does not adhere well enough to resist corrosion. More aggressive pretreatment typically involves higher acid concentration of the phosphate stage to de-scale the weld surface. Alternately, the weld surface can be de-scaled mechanically with an aluminum oxide blast. This media blasting should be followed by phosphate (iron or preferably zinc) pretreatment.

I am not surprised that the fence supplier is balking at a remedy after eight years in the field. I think they should stand behind their product; however, many companies stick strictly to the details of the warranty.

As for a remedy worth considering, you can media blast the affected areas then apply a room temperature phosphoric acid metal pretreatment. You can usually

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find these at your local DIY. Follow the instructions and make sure the surface is completely dry before applying a repair coat. I recommend applying a two-part epoxy primer followed by a polyurethane topcoat. Both would be liquid paint.

The coating failures are an unfortunate issue that could have been avoided if the fence supplier was a bit more diligent in the metal preparation for their product before powder coating. I hope that this explanation helps.

— Joe Powder

I'll Tell You Flat Out

Q Dear Joe,

What are the typical gloss ratings of what is considered to be a “flat” powder coating? Is it less than 5 units on all angles of specular gloss measurement? I ask because we want to promote a filler for use in a flat powder coating. We started off with a high gloss coating and substituted in the coarse grade fillers to show their matting effect, the resulting formula is essentially an eggshell, or “mid sheen.” Knowing what we know about how much the gloss drops when 20 percent of the formula is a specialty filler, can you provide a formula containing our filler that would be representative of an actual flat or matte powder coating? One of the first things that I suspect the customers will ask me is: “What loading of our filler is needed to bring the formula to a true flat finish and how might such a formula look?” So, again, what are the typical gloss ratings of what is considered to be a “flat” powder coating?

Regards,
Dino P., Cleveland

A Hi Dino,

Let's start out with a quick tutorial on the concept of gloss and how it is measured. Here is how the experts at www.gloss-meters.com describe gloss:

“Gloss is an aspect of the visual perception of objects. It is the attribute of surfaces that causes them to have shiny or lustrous, metallic or matte appearances. Gloss is a visual impression that is caused when a surface is evaluated. The more direct light is reflected, the more obvious will be the impression of gloss. Gloss effects are based on the interaction of light with the physical properties of the sample surface. The other influencing component is the physiological evaluation scale. The human eye is still the best tool to evaluate

gloss differences. However, the visual surface control is insufficient, because evaluation conditions are not clearly defined, and people see and judge differently.”

Gloss is measured using a glossmeter that reflects a beam of light on a surface at a specific angle relative to the perpendicular of a surface. The measurement of gloss is governed by ASTM D523 Standard Test Method for Specular Gloss. “GU” refers to “Gloss Units” and not “% Gloss” as many people incorrectly assume. The values generated from a glossmeter are related to the amount of reflected light from a black glass standard with a defined refractive index. The measurement value for this defined standard is equal to 100 gloss units. Materials with a higher refractive index than black glass can have a measurement value above 100 gloss units (GU).

The descriptions of flat, matte and dead matte are rather inexact. In the powder coating world we rarely use the term “flat” but rather matte and dead matte. Matte is typically 3 to 10 GU (60°). Dead matte is <3.0 GU and can be <1.0 GU. For very low gloss coatings both 60° and 85° light angles are used. 60° produces a lower value than 85°. For dead matte finishes 85° specifications are common, typically around 3.0 GU.

You asked because you want to promote your filler for use in a flat powder coating, but since you started off with a high-gloss coating and substituted in coarse grade fillers to show their matting effect, the resulting formula is essentially an eggshell, or “mid sheen.” To answer your question: Knowing what we know about how much the gloss drops with a 20 percent concentration of our filler, can you provide a formula containing our filler that would be representative of an actual flat or matte powder coating?

Yes, but matte and dead matte finishes typically employ a combination of techniques, i.e., specialty fillers, cure differential, waxes and polymeric incompatibility to create gloss this low. Furthermore, different formulating techniques are used for different powder chemistries. For instance, epoxies have their own formulation techniques, whereas polyesters and polyurethanes employ significantly different formulating approaches to achieve a matte finish. Consequently, matte finishes are unique and very chemistry specific.

I hope that this helps in your understanding and provides insight into the next steps in your evaluations and experimentation.

— Joe Powder

Joe Powder is our technical editor, Kevin Biller. Please send your questions and comments to Joe Powder at askjoepowder@yahoo.com.

Editor's Note: Letters to and responses from Joe Powder have been edited for space and style.