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**Ask Joe Powder™**

## Worth the Wait

**Q** Hey Joe,  
We powder coat formed wire products made from 1008/1010 grade steel. The powders are epoxy and polyester hybrid/TGIC types. How long must we wait, after cure: a) to test for crosshatch adhesion and b) before we do the MEK rub tests? If we recoat over a thin coat, will that affect the cure time, affecting the same tests?

Thank you in advance,

Norm G.  
Angola, IN

**A** Hey Norm,  
First let's talk about the powder material types. It sounds like you may be using two powders—a hybrid (epoxy-polyester) and a polyester-TGIC product. Regardless of powder type, the manner in which you conduct the after-cure testing is the same.

Crosshatch adhesion testing and MEK solvent resistance can be evaluated as soon as the parts have reached ambient temperature. This is because, with powder coating technology, the entirety of cure occurs in the oven. The polymers and curing agents react and harden while they are in a molten state as long as they're above a certain threshold temperature specified by the powder manufacturer. Unlike most liquid coatings, there is no post-cure occurring after the parts exit the baking process.

Regarding your question about recoating over a thin coat, this will not affect the cure time. It is important to note that recoats may not have the same adhesion as a single thicker coat. Sometimes inter-coat adhesion is

affected by oven conditions and bake time (overbaking can impair adhesion).

Best regards,

— Joe Powder

*Norm's response:*

Hi Joe,

Thanks again for your response which raises another question from our sales engineering department. Is there a minimum time to wait to do the crosshatch test after salt spray tests are performed? We test for a few parameters, for different customers, namely 96 hours to 192 hours to failure, sometimes over a primer, and sometimes over a double pass topcoat.

Norm,

A scribe into the coating should be done before the test panels/parts are put on salt spray testing. We normally check for scribe creep and blistering about 15 minutes after we pull the panels out of the cabinet—basically enough time for the panels to dry. We use a wooden tongue depressor and vigorously rub across the scribe. ASTM D1654 and D714 are used to rate and report the evaluations.

Best regards,

— Joe Powder

## Pass the Powder, Please

**Q** Hello Joe,  
I would like to know about a quality checklist of food grade powder coating as per FDA requirements.

Manish S.  
Toronto, Canada

**A** Hello Manish,  
Powder coatings that may come in contact with food products are regulated under the US 21 CFR (Code of Federal Regulations) 175.300 "Resinous and Polymeric Coatings." This protocol provides formulators a "white list" of ingredients that can be used in a powder coating formula and be acceptable for contact with food products. The ingredients listed allow the formulator to produce either an epoxy, epoxy-polyester, or polyester-based powder coating. It is important to note that not all epoxy, epoxy-polyester, or polyester-based powder coatings are FDA compliant for food contact. Only the products that are specifically

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formulated per the boundaries of 21 CFR 175.300 can be considered compliant. Your powder coating supplier will furnish a letter stating compliance if required.

Kind regards,

- Joe Powder

## Let's Be Clear

**Q** Dear Joe,  
We tried using a clear powder coat years ago which resulted in orange peel. Have there been any advances with clear powders today?

David J.  
Port St. Lucie, FL

**A** Hi David,  
Clear powder coatings have been around for years. Depending upon chemistry and intended use they can range from a low gloss texture to a crystal clear nearly glass-like finish. The apex of powder clear coat technology was achieved back in 1999 when BMW began applying an acrylic-based powder clear coat to their 7 series automobiles at their plant in Dingolfing, Germany. Other examples of high quality, smooth powder clear coats are automotive alloy wheel coatings and finishes used on nickel plated kitchen and bath fixtures. These are usually polyester-based powders. The product you evaluated may have been

developed for an end use requiring functionality rather than appearance or the material may have been beyond its useful product life. Some powder coatings can chemically advance with age and/or if they are not stored per manufacturer recommendations. This is especially true with low temperature curing types (i.e., less than 325 degrees Fahrenheit). Chemical advancement causes a reduction in melt-flow and a resultant increase in orange peel. Another possibility is you may have applied less powder coating than specified. Powder coatings typically achieve ultimate smoothness at a film thickness of 2.5 to 3.5 mils.

If you would like to re-evaluate powder as a clear coating, I suggest you contact one of your powder coating suppliers and request a high flow, smooth product that meets your requirements. Ultimate smoothness will be attained with an acrylic powder; however, very good-looking finishes can be achieved with polyester or epoxy-based powders.

Best regards,

- Joe Powder

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



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