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Ask Joe Powder

How Low Can You Go?

Hello Joe,

Q I have come across several articles which mention different standards for minimum electrical conductivity for the surface of non-conductive/nontraditional substrates so that electrostatic spray application can be used. But haven't come across a standardized value for that.

Is there a standardized number for minimum surface conductivity for non-traditional/non-conductive substrates so that powder can be applied with traditional electrostatic spray application on substrates like poly carbonate, ABS, MDF, etc. and still acceptable transfer efficiency can be achieved?

And would the requirement for surface conductivity be less for tribo than corona gun? And if non-conductive substrate were made conductive by some magic then how much conductivity it should possess to have comparable transfer efficiency with metal substrates?

Regards,
Atman F.

A

A Hi Atman,
Regarding conductivity measurement, some interesting work has been conducted by PolyOne Corporation. Jane Spikowski, one of their researchers, published a paper on the conductivity of plastics at the 2013 Automotive Composites Conference and Exhibition (ACCE). She was using

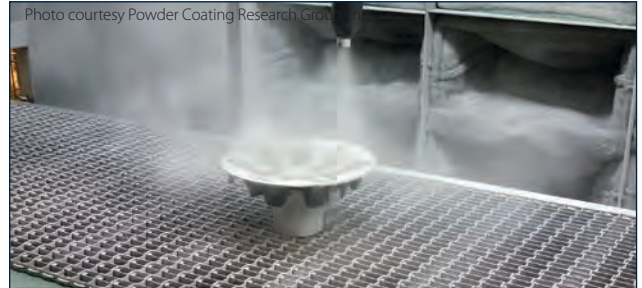


Photo courtesy Powder Coating Research Group
Powder coating a "non-conductive" plastic part is shown in this picture.

conductivity tests that generated reproducible data. It was interesting when she brought plastic plaques having varying conductivity to the PCR Group lab. Our practical tests provided very immediate feedback on what could be electrostatically coated and what could not. I am sure that she correlated PCR Group lab results with her conductivity testing. I don't recall her sharing that with us.

As for corona vs. tribo, tribo will work a little better mainly because there is less extraneous charge (particles are charged and not the air). I can't say that it would require less conductivity on the surface, but it would be interesting to compare it to corona.

Thank you for the question and I hope this helps.

— Joe Powder

You Give Me FEVE

Hi Joe,

Q We have heard that fluoro-ethyl-vinyl ether (FEVE)-based polymers are the only process-friendly fluoro powders which can meet the AAMA-2605 architectural standard (10 yrs. durability). Can you remind me why other fluoropolymers can be available in powder form (ETFE, PTFE), but cannot be used for AAMA-2605 applications?

Cheers,
Hongli W.

Hi Hongli,

Here is my perspective on this subject: poly-tetrafluoroethylene (PTFE) cannot be used as a film former in powder coatings because of its physical properties. The melt point of PTFE is about 621°F (327°C) and it isn't a very sharp melt point. My understanding is that it has to undergo pressure as well as heat to form a film. Architectural substrates could never take this heat. The melt point of ethylene-tetrafluoroethylene (ETFE) is somewhat lower, around 437°F (225°C), but still rather high for an aluminum substrate. Polyvinylidene difluoride

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(PVDF) has been used as a polymer for exterior durable powder coatings. It's a thermoplastic and is tricky to process. The crystallinity of PVDF changes in the extruder and a managed cooling period is required after compounding. This makes FEVE a better choice in my opinion. It's more process forgiving.

— Joe Powder

Wood You Enlighten Me?

Hi Joe,

Q I have a technical question to ask. I hope you have the answer. I read some non-technical articles mentioning powder coating on wood. How can this be done when wood is a non-magnetic material?

Have a good day!
Jinwen

Hello Jinwen,

A We use electrostatics and not magnetism to deposit the dry powder onto a substrate. This is still a good question. Most wood has the surface characteristics that allow electrostatic deposition of powder onto the wood. In some cases, like medium density fiberboard (MDF), the "wood" has to be preheated to allow moisture to migrate to the surface. This migration provides enough conductivity to deposit the charged powder.

One of the challenges to coat wood is having a powder coating chemistry that cures at low temperatures. If the cure temperature is too high the wood emits volatiles that ruin the coating appearance. The powder coating industry has developed chemistries and processes that allow MDF to be coated commercially.

— Joe Powder

Too Thin?

Hello Joe,

Q We are a manufacturer of solid brass vanity sink legs. We would like to offer some powder coat finishes on our legs, specifically black. However, the powder thickness *must* be kept to 0.001" to 0.0015" maximum. Is this very thin film possible with powder coating? Please advise.

Thanks,
Mark

Hi Mark,

A Thank you for your inquiry. Powder coatings are a very durable coating that can work well for your application. You mention 0.001 to 0.0015 inches as the tolerance that must be met to comply with the design of your products. Powder coatings are typically applied somewhat thicker than this. We quote the recommended thickness in mils (0.001") or microns. Nearly all powder coatings are recommended to be applied at 1.5 mils (about 40 microns)

and higher. If the 0.001 thickness is an absolute requirement, then it will be very difficult to find a powder coating that will work for your application.

Another important consideration is cure temperature. Powder coatings typically require a bake temperature of 350°F (177°C) and higher. If the brass components discolor around these temperatures, then it will be a challenge to find a product that cures at a significantly lower temperature. The chemistries are available but they are a specialty.

I hope that this helps you in your decision making. Please let me know if you have any further questions.

— Joe Powder

The Good Books

Hi Joe,

Q I'm a new guy to the powder coat process, and I was wondering if there is any source material or a "powder coat bible" of sorts to help me out with the jargon and nuances of the field.

Thank You,
Marquis C.

Hi Marquis,

A Welcome to the powder coating world. It's fun and exciting and always offers a new challenge to conquer. As for powder coating "bibles," I can offer two recommendations. For the applicator, I offer *Powder Coating: The Complete Finisher's Handbook - 4th Edition*. This is the newly revamped edition and can be purchased here:
<https://powdercoating.site-ym.com/store/ViewProduct.aspx?id=5522715>

For the budding young (or old) formulator, I recommend: *Powder Coatings: Foundation for the Novice Formulator*. It can be found here:

<http://www.pcimag.com/products/546-powder-coatings-foundation-for-the-novice-formulator-by-kevin-biller-cd>

I also recommend that you become an avid consumer of this magazine and other similar publications for the latest technology and trends in the industry. In addition, you should attend webinars and conferences hosted by the Powder Coating Institute. The PC Summit is coming up in October in Columbus. It's always a good event for newcomers to the technology.

Good luck and please let me know if I can help.

— Joe Powder

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

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