

Transparent powder with effect pigments

Processing IGP transparent powder coatings containing effect pigments

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A DOLD GROUP Company

Introduction

Like all effect powder coatings, transparent powder coatings with effect pigments also demand higher requirements of the coating process than single-color powder coatings. The transparency of the cured paint film is an additional challenge with these products.

This Processing Instruction, VR 205, was prepared in order to provide users with assistance in processing IGP transparent powder coatings with a metallic effect (G -> 5th position of the IGP article description).

As opposed to deviations in the effect pigment content or the effect pigment alignment in the powder coating, deviating coating thicknesses or different substrates can result in a visually different effect appearance.

IGP effect powder coatings come in five main processing categories, from 1-STAR * to 5-STAR*****.

Because transparent powder coatings with effect particles, as described above, present users with higher requirements than normal powder coatings, they are labeled with the 1* classification.

This processing instruction was issued to inform users about possible causes of faults and to provide a guideline for optimal coating results.

Pre-treatment

Unlike coatings that provide an opaque cover on the substrate, the coatings in this product group are semitransparent. This makes higher demands of the substrate as well as the pre-treatment.

The substrate must be pre-treated in such a way that it presents the same appearance on all the parts to be coated. Even fine scratches, grazing, or discolorations caused by the pre-treatment impact on the final shade of the coating.

If it is not possible to ensure an absolutely homogenous substrate, an opaque coating should be applied prior to the transparent powder coating. Because this undercoat also impacts on the top coat, this decision must be taken before limiting samples are produced.

Project organization

One batch, one application facility

If the components are installed directly adjacent to each other, we recommend determining the required powder amount for the entire order and planning a certain reserve in order to coat the entire application with a single production batch. This guarantees absolute color and effect consistency of the coating on all objects.

Experience has shown that varying results in terms of shade and effect formation can occur when the product is applied using devices from different manufacturers (due to the different characteristic curves generated by the high-voltage generators).

Processing one order in different cabin types should be avoided. No changes to the coating plant processing or application parameters may be made when processing a certain consignment. If it is determined that plant data / application parameters are ideal, they must be documented and observed. This procedure and the parameter settings must also be observed for follow-up orders.

We urgently recommend producing limiting samples to check the match with the shade ordered (input inspection) as well as to monitor the shade and effect appearance throughout production. An inspection to determine any deviation from the tolerance limits on coated parts must be carried out under suitable lighting before supply (output inspection).

The coating thickness and the substrate have a significant influence on the visual appearance of the coating. For this reason, limiting samples and release samples must be produced on the same substrate and with the same pre-treatment. The coating thickness of the samples must also be identical to the target thickness of the subsequent production coating.

If it is not possible to avoid different substrates / pre-treatments, we urgently recommend applying the coating in a two-coat system. This involves first coating a neutral substrate, then applying the transparent effect powder coating.

Processing

It is best to process transparent powder coatings with effect pigments in automated coating plants

Ideally, manual application that is necessary in semi-automatic operation should always be performed as a preliminary coat. In this case, we recommend observing a spraying distance of more than 250 mm, at least for the final coating. This also applies for pure manual application. During the coating process, ensure a constant coating thickness distribution on and between the individual parts as far as possible. Even slight deviations from approx. $\pm 5 \mu\text{m}$ can cause noticeably lighter or darker colors on darker, varnish-type shades.

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Recovery operation

Powder facilities equipped with a powder recovery via cyclone system do not separate the finest powder particles and effect particles in the cyclone. Instead, these particles are continuously removed from the powder. This removal offsets the ratio of the effect particles to the basic shade.

In order to completely avoid shade changes caused by effect losses during the coating, the processing of transparent coating powders with effect particles can only be performed in pure loss mode without using the recovery mode.

In the case of automatic coating, it is possible with a corresponding batch size to add a certain quantity of recovered powder, depending on the shade classification. For details, please see the table at the end of this document.

In this case, we recommend that you prepare limiting samples prior to the start of production and use them throughout the entire production in order to check the shade and effect. If the shade and effect deviate, increase the ratio of fresh powder as required.

We recommend that, before the start of coating, you feed in a portion of the powder from recovery. This means you use a stable mix of fresh and recovered powder right from coating of the first object.

Plant maintenance and cleaning

To ensure the coating plant achieves reproducible coating results, the maintenance work for replacing parts subject to wear in the entire plant must be performed at the specified intervals, as recommended by the manufacturer. Various functional tests, e. g. checking the high voltage, must be carried out at regular intervals.

Suspension of the parts

The suspension of the parts must be determined prior to coating (horizontal or vertical). The intermediate spacing between the coating objects within the hangers as well as the spaces between the hangers must be kept as small and regular as possible. If there are large distances between the hangers, it is advisable to automatically switch the guns on and off via a parts detection system.

Furthermore, it must be ensured as far as possible that similar components are always coated together.

Curing

Different curing temperatures and heating speeds of the parts must be avoided. Furthermore, thick and thin-walled parts must be coated separately. Observe the recommended range of curing conditions without fail.

Earthing

Special attention must be given to sufficient earthing when processing coating powders with a pearl mica effect.

This measure significantly contributes to a uniform shade and effect formation consistency.

Other applicable documents

TI 000 classification of effect powder coatings.
All corresponding technical data sheets

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Recommendations for processing IGP-Effectives® effect powder coatings

The values stated here are recommended values. When processing IGP transparent powder coatings with effect pigments, we recommend that you adjust the processing parameters of the coating plant to the product to be processed.

Plants and/or processing parameters (devices / accessories)	Adjustment (parameters) according to classification	Possible effect (comment)
	*	
High-voltage setting (pistol)	60-90kV	setting range for processing
Current limit μA (pistol)	$\leq 20 \mu\text{A}$	reduces possible edge greasing
Total air flow m^3/h / conveying + dosing air (inner diameter of powder hose)	12 mm = 5 m^3/h	prevents pulsing of the powder cloud, ensures optimal atomization.
	11 mm = 4 m^3/h	
	10 mm = 3 m^3/h	
POE powder hose with integrated earthing (injector pistol)	injector earthing	prevents electrostatic charging of the powder in the powder hose.
Nozzle (pistol) with flat spray nozzle	suitable	good depth effect, even atomization.
Nozzle (pistol) with baffle plate	suitable	reduced depth effect
Processing with ion-leakage ring (pistol)	with or without suitable	reduces spray-back effects, improves flow properties at coating thicknesses of $> 120 \mu\text{m}$.
Spraying distance of coating (pistol to part)	$< 180 \text{ mm}$	even coat thickness distribution
Coating with tribo pistols (pistols)	not suitable	significant color deviations possible
Powder feeding with injector so that the powder flows inside the container	highly suitable, fluidizing air as required	even powder feeding and powder cloud
Powder feeding with injector from the supply container	suitable	partly slightly irregular feed and therefore irregular coat thicknesses.
Screening with US screen (screening machine)	suitable for mesh size $> 140 \mu\text{m}$	better fluidization, more even application
Maximum share of recovered powder in circuit operation without checking the shade	0%	prevents shade deviations during coating

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Plants and/or processing parameters (devices / accessories)	Adjustment (parameters) according to classification	Possible effect (comment)
	*	
Maximum share of Mica Bond recovered powder in circular operation with pre-checking the shade	0%	prevents shade deviations during coating
Maximum share of Premium Bond recovered powder in circular operation with pre-checking the shade	≤ 10%	prevents shade deviations during coating
Document processing parameters (control unit program)	recommended	enables reproducibility of the coating results
Produce limiting sample first	urgently recommended, may only be done on identical substrate on tools from the coating order. Coating thickness must correspond with the target coating thickness of the final coating.	prevents the possibility of subsequent complaints due to high shade deviations
Coating on various coating plants	not recommended	different coating plants can create deviating effect characteristics
Manual pre-coating of the parts in semi-automatic operation	possible under certain conditions	avoid coating thickness fluctuations
Manual follow-up coating of the parts in semi-automatic operation	possible under certain conditions	avoid coating thickness fluctuations
Pure manual coating	not recommended	avoid coating thickness fluctuations