IGP POWDER COATINGS

Processing guideline

VR205 – Transparent powder with effect

Introduction

Like all effect powder coatings, transparent powder coatings with effect pigments place higher demands on the coating than uni powder coatings. In addition, the requirements for these products are increased by the transparency of the baked paint film.

This processing guideline VR 205 has been drawn up to assist users in the processing of IGP transparent powder coatings with metallic effect (G->5th digit of the IGP article designation).

In contrast to deviations in the effect content or the alignment of the effect pigments in the powder coating, deviating layer thicknesses or different substrates can also lead to a visually deviating effect image.

There are five main processing categories for IGP effect powder coatings, from 1-STAR* to 5-STAR*****. As transparent powder coatings with effect particles, as described above, place higher demands on the user than normal powder coatings, these powders are labelled 1*.

Pretreatment

In contrast to the substrate-covering coatings, the coatings in this product group are translucent (semi-transparent). This places increased demands on both the substrate and the pretreatment.

The substrate must be pretreated so that it has the same appearance on all workpieces. Even fine scratches, scuff marks or discolouration caused by the pretreatment will affect the shade of the coating later on.

If it is not possible to ensure an absolutely homogeneous substrate, an opaque coating should be applied before the transparent powder coating is applied. As this coating also has an influence on the top coat, this decision must be made before limit samples are created.

Order organisation

One batch - one application equipment

If the components are installed directly next to each other, we recommend determining the amount of powder required for coating the entire job, allowing for a certain reserve and coating the entire job with one finished batch of paint. This ensures colour and effect consistency when coating the entire job.

Experience has shown that Application with equipment from different manufacturers (due to different characteristics of the high voltage generators) produces different results in terms of shade and effect formation.

The processing of one application on different types of booths should be avoided. When processing a specific commission, no changes may be made to the processing or application parameters on the coating plants. Once system data or application parameters have been determined to be optimal, they must be documented and strictly adhered to. This procedure and parameter settings must also be adhered to when coating subsequent orders.

We strongly recommend the production of limit samples to check for conformity with the ordered shade (incoming inspection!) and to monitor the shade and effect throughout production. A check for any deviation from the tolerance limits must be carried out under suitable lighting conditions before delivery of coated parts (outgoing inspection).

As the coating thickness and substrate have a significant influence on the visual appearance of the coating, limit and approval samples may only be made on the same substrate and with the same pretreatment. The samples must also have the identical, desired layer thickness of the subsequent coating.

If it is not possible to avoid different substrates / pretreatments, it is strongly recommended to apply the coating in a two-coat system. For this purpose, a neutral substrate is coated and then the effective transparent powder coating is applied.

Processing

Processing of transparent powder coatings with effect should ideally be carried out in automated coating operation.

Ideally, any necessary manual application should always be carried out as a pre-coating in semi-automatic operation. For this purpose, we recommend a spraying distance of at least 250 mm for the final coat. This also applies to Processing in manual coating mode only. During coating, ensure that the layer thickness distribution on and between the individual workpieces is as uniform as possible. Even slight deviations from approx. +-5µm can lead to noticeably lighter or darker colour tones with darker glaze-like shades.

Reclaiming

In powder systems with cyclone recycling systems, the finest powder grains and effect particles are not separated in the cyclone and are continuously removed from the powder. This removal results in a shift in the ratio of effect particles to the base colour. In order to completely rule out colour changes due to effect losses during the coating process, the processing of transparent coating powders with effect particles can only be carried out in pure loss mode without reclaiming.

In the case of automatic coating with a corresponding batch size, a certain amount of reclaimed powder can be added depending on the classification of the shade. Please refer to the table at the end of the document. In this case, we recommend creating limit samples before the start of production and using them throughout production to check the shade and effect. If there is a deviation in shade and effect, the proportion of fresh powder should be increased accordingly.

It is recommended to feed part of the powder through the reclaiming process before coating begins in order to use a stable mixture of fresh and reclaimed powder during the coating of the first object.

Maintenance and Cleaning of the system

In order to ensure the reproducibility of coating results on the coating system, the maintenance work recommended by the manufacturer to replace wearing parts must be carried out on the entire system at the intervals specified for this purpose. Various functional checks, such as checking the high voltage, must be carried out at regular intervals.

Mounting the parts

The mounting of the workpieces must be determined before coating (horizontal or vertical). The distances between the coating objects within the hanger as well as the distances between the hangers should be as small and even as possible. If the distances between the hangers are large, it is advisable to switch the guns on and off automatically via a parts detection system.
It is also important to ensure that similar components are always coated together.

Curing

Different curing temperatures and heating speeds of the parts must be avoided, just as thick and thin-walled parts must not be coated at the same time. The recommended curing window must be adhered to.

Earthing

When processing coating powders with pearl mica effect, particular care must be taken to ensure sufficient earthing. This measure contributes significantly to a uniform consistency of the shade and effect formation.

Applicable documents

TI 000 Classification of effect powder coatings.

Recommendations for Processing IGP transparent powder coatings with effect

The values given here are recommendations. When processing IGP transparent powder coatings with effect, we recommend adapting the processing parameters of the coating plants to the product to be processed.

Equipment or processing parameters (equipment / accessories)	Setting (parameters) according to categorisation	Possible effect (remark)
	*	
High voltage setting (gun)	60-90 kV	Setting range for Processing
Current limiter µA (gun)	≤ 20 µA	Reduces possible spray-back effects
Total air$^{m3/h}$/ conveying + dosing air (inner diameter of powder hose)	12 mm = 5$^{m3/h}$ 11 mm = 4 m3/h 10 mm = 3 m3/h	Prevents pulsation of the powder cloud, ensures optimum atomisation
POE powder hose with integrated earthing (injector gun)	Earthing the injector	Prevents electrostatic charging of the powder in the powder hose
Nozzle (gun) with flat spray nozzles	Suitable for	good depth, even atomisation.
Nozzle (gun) with buffle plate	suitable	reduced depth of atomisation

Equipment or processing parameters (equipment / accessories)	Setting (parameters) according to categorisation	Possible effect (remark)
	*	
Processing with / without ion-leakage ring (gun)	Suitable with or without	reduces spray-back effects, improves levelling properties with Film thickness > 120 µm.
Spraying distance coating (gun-workpiece)	≥ 250 mm	Uniform layer thickness distribution
Coating with tribo guns (guns)	not suitable	Significant colour deviations possible
Powder feed from fluidised container	well suited, fluidising air as required	Uniform powder delivery and powder cloud
Powder delivery from the box	not suitable	sometimes slightly irregular conveying and therefore irregular layer thicknesses.
Screening with US screen (screening machine)	suitable with mesh size >140µm	Better fluidisation, more even application
Maximum proportion of reclaimed powder in recirculation mode without testing the shade	0%	Prevents colour deviations during coating operation
Maximum proportion of Mica Bond reclaimed powder in recirculation mode with pre-testing of the shade	0%	Prevents colour deviations during coating operation
Maximum proportion of premium bond reclaimed powder in circulation mode with pre-testing of the shade	≤ 10%	Prevents colour deviations during coating operation
Document processing parameters (control unit programme)	Recommended	Enables reproducibility of the coating results
Create limit samples in advance	strongly recommended May only be applied to identical substrates on workpieces of the coating application. Layer thickness must correspond to the target layer thickness of the final coating.	Prevents excessive colour deviations from being subsequently objected to
Coating on different coating plants	Not recommended	Different coating plants sometimes produce different effect characteristics
Manual pre-coating of the workpieces in semi-automatic operation	possible to a limited extent	Layer thickness fluctuations must be avoided

Equipment or processing parameters (equipment / accessories)	Setting (parameters) according to categorisation	Possible effect (remark)
	*	
Manual follow-up coating of the workpieces in semi-automatic operation	conditionally possible	Layer thickness fluctuations must be avoided
Manual coating only	not recommended	Layer thickness fluctuations must be avoided