

Introduction

This Processing Instruction, VR 203, was prepared in order to provide users with assistance in processing IGP powder coatings with a metallic effect (D -> 5th position of the IGP article description). The metallic impression of these metallic coatings is produced by high-coverage aluminum particles near to the surface. In order to sustainably protect these pigments from oxidation, metallic coatings of this type must be overcoated with a transparent protective coating.

IGP metallic effect powder coatings which are overcoated with clear varnish must be identified with an "H" at the 11th position of the article description.

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

The metallic effect products are all labeled as category 1* because they are much more challenging to process than single-color powder coatings without metallic effect particles.

Project Organization

One batch, one application facility, identical parameters

If parts with metallic effect powder coatings are installed directly adjacent to each other, determine the required powder amount for the entire order, plus a certain reserve, and coat the entire order with a single production batch number. This minimizes color and effect differences when coating the entire order. Experience shows that the results in terms of shade and effect characteristics vary due to the differing coating equipment characteristics from the various manufacturers.

Electrostatic parameters such as the level of the applied high voltage, the current limiter setting (μA) as well as the utilization of ion-leakage rings can significantly impact the charging behavior as well as the shade and effect formation. It is strongly advised to prepare limiting samples prior to the start of production and to use them throughout the entire production and output inspection in order to check the shade and ef

Processing

When processing IGP metallic effects, we recommend using corona guns with a negative polarity electrostatic charge. Corona guns and their nozzles must be suitable for the processing of metal effect powder coatings. It is not necessary to limit the spray current to $< 80 \mu\text{Ampere}$.

Due to the proportion of metallic effect pigments, a limitation of the spray current can lead to short circuit effects and, consequently, a charging loss of the metallic effect powder coating to be processed. Increasing the nozzle spray air to max. 0.5 m³/h counteracts a charge loss via the short circuit effect.

Depending on the formula and proportion of effect agent, an ion-leakage ring can improve the flow characteristics. Any manual application that is necessary in semi-automatic operation should always be performed as a preliminary coat. When dealing with objects to be coated on both sides (e. g. profiles), the side that will be primarily visible should be coated last. It is recommended to set the high voltage to between 50 and 60 kV when finishing the metal effect powder coating with clear varnish.

Recovery Operation

Due to the proportion of overspray that is recovered via the separation system, a concentration of effect pigments may occur when recovery by means of filter when processing metallic effects. Alternatively, a reduction of effect pigments may occur when recovery via cyclone.

Powder facilities equipped with a cyclone recovery 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 effect to shade ratio. This usually results in the shade becoming darker.

In order to avoid shade changes caused by effect losses during coating, the processing of IGP metallic effects that were manufactured in the IGP Mica Bond process (H10 suffix) can only be performed in pure loss mode without recovery powder. When automatically processing IGP metallic effects that were manufactured in the IGP Premium Bond process (H30 suffix), approx. 10 % of recovered powder can be added to appropriate batch sizes provided that an ideal mixture of fresh powder is ensured. However, the coater remains responsible for creating a tolerable and reproducible shade. In all cases, it is advisable to prepare limiting samples prior to the start of production and to use them throughout the entire production and output inspection in order to check the shade and effect.

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 that similar components are always coated together. Mixing thick and thin-walled parts in the coating process must be avoided at all cost

Earthing

Special attention must be given to sufficient earthing when processing coating powders with a metallic effect. This measure significantly contributes to a uniform shade and effect formation consistency.

Curing

Depending on the melt viscosity, the temperature management in the stoving oven and the mass of the coated components may cause a change in the effect (visually apparent as a difference in shade). This means that varying curing temperatures and heating speeds must be avoided. Furthermore, thick and thin-walled parts must be coated separately.

Plants and/or processing parameters (devices / accessories)	Adjustment (parameters) according to classification	Possible effect (comment)
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High-voltage setting (pistol)	80-90 kV	setting range for processing
Current limit μA (pistol)	> 80 μA	for normal operation
Total air flow m^3/h / conveying + dosing air (inner diameter of powder hose)	12 mm = 5 m^3/h 11 mm = 4 m^3/h 10 mm = 3 m^3/h	prevents pulsing of the powder cloud, ensures optimal atomization
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 / without ion-leakage ring (pistol)	processing without ion-leakage ring recommended	
Spraying distance of coating (pistol to workpiece)	> 250 mm	even coat thickness distribution
Coating with tribo pistols (pistols)	not suitable	insufficient charging / massive shade deviation
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 under certain conditions	partly slightly irregular feed
Screening with US screen (screening machine)	suitable for mesh size <140 μm	better fluidization, even application
Maximum share of recovered powder in circuit mode without checking the shade	pure loss mode	prevents shade deviations during coating
Document processing parameters (control unit program)	recommended	facilitates reproducibility of the coating results
Produce limiting sample first	recommended	prevents the possibility of subsequent complaints due to high shade deviations
Coating on various coating plants	possible under certain conditions after comparison	different coating plants can create deviating effect characteristics
Manual pre-coating of the parts in semi-automatic operation	possible	low tendency toward color deviations
Manual follow-up coating	possible under certain	tendency toward possible


