



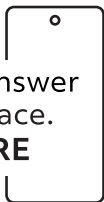
POWDER  
COATINGS

# IGP

## SERVICE GUIDE

Metallic Substrates

There is an answer  
to every surface.  
**IGP FOR SURE**



## **Preface**

Dear customer,

You are fully aware of the challenge – your customers demand flawless surfaces in consistent quality. Meeting this requirement pushes you, as a powder coater and plant operator, to your limits every day.

To successfully accomplish this task you need the support of capable partners in the areas of pre-treatment, powder coating and plant-specific know-how. This enables you to satisfy your customers' demands for high quality – by drawing on the deep pool of experience and coating expertise within your company. You accept support from your partners, train your employees regularly and thus know precisely what needs to be done to avoid flaws in the coating process.

In this IGP Service Guide you will find an additional repository of answers and expert knowledge – as well as tips and tricks on pre-treatment, coating process and other topics.

The IGP Service Team offers professional support for the processing of IGP powder coatings.

Your IGP Service Team

There is an answer to every surface.  
**IGP FOR SURE**

## Table of Contents

<b>1. Pre-treatment .....</b>	<b>6</b>	<b>3. Cured surface .....</b>	<b>16</b>
1.1. Pre-treatment of aluminum .....	6	3.1. Spitting on the surface.....	16
1.1.1. Rinsing water forms beads, insufficient wetting .....	6	3.2. Cratering.....	17
1.1.2. After etching: surface becomes discolored, stained or milky/cloudy .....	6	3.3. Pin-holes .....	18
1.1.3. Conversion layer forms stains, dry edges .....	6	3.4. Picture frame effect .....	18
1.2. Phosphating of steel and galvanized steel .....	7	3.5. General impurities.....	19
1.2.1. Rinsing water forms beads, insufficient wetting .....	7	3.6. Blisters .....	20
1.2.2. Phosphate layer not sealed, corrosion .....	7	3.7. Edge and droplet formation.....	20
1.2.3. Phosphate layer too thick, dusty.....	7	3.8. Wetting impairments .....	21
1.2.4. Uneven, spotty phosphate layer .....	7	3.9. Irregular fine structure .....	22
1.3. Mechanical pre-treatment.....	8	<b>4. Surface characteristics .....</b>	<b>23</b>
1.3.1. Bimetallic corrosion/galvanic corrosion.....	8	4.1. Color deviations (uni-color shades) .....	23
1.3.2. Grinding traces/sanding marks .....	8	4.2. Color deviations (effect powder coatings) .....	24
<b>2. Coating .....</b>	<b>9</b>	4.2.1. Color deviations compared to the master sample/color chart.....	24
2.1. Fluidization .....	9	4.2.2. Fluctuating effects.....	25
2.1.1. Poor fluidization (holes/air channels in the fluidized surface) .....	9	4.2.3. Streaking and cloud formation.....	26
2.1.2. Poor fluidization (blistering/powder spray from container) .....	9	4.3. Lack of opacity .....	26
2.2. Powder deposits in the powder hose .....	10	4.4. Fluctuating gloss levels.....	27
2.3. Powder falls off before curing (poor transport adhesion) .....	11	<b>5. Film properties.....</b>	<b>28</b>
2.4. Clumping tendency in the carton, fluid container .....	12	5.1. Mechanical properties .....	28
2.5. Poor penetration behavior into edges and cavities .....	12	5.1.1. Cracking, chipping of the surface.....	28
2.6. Coating thickness .....	13	5.1.2. Flaking, peeling of the coating layer.....	28
2.6.1. Coating thickness too high .....	13	5.2. Other properties .....	29
2.6.2. Coating thickness too low .....	14	5.2.1. Conductive properties .....	29
2.6.3. Uneven coating thickness.....	14	5.2.2. Flow.....	29
2.7. Deposits on the spray nozzle .....	15	<b>6. Keyword index .....</b>	<b>30</b>
		<b>7. Notes .....</b>	<b>37</b>

## 1. Pre-treatment

IGP works with various pre-treatment manufacturers to ensure the optimum combination of new pre-treatment technologies and our powder coatings. Nevertheless, the information we provide with regard to pre-treatment is only a general overview based on our experience. Appropriate pre-treatment is essential for a high-quality surface and durable corrosion protection.

### 1.1. Pre-treatment of aluminum

#### 1.1.1. Rinsing water forms beads, insufficient wetting

Likely cause	Recommended solutions
Insufficient degreasing effect due to poorly soluble oils/greases, high-temperature release agents, cured release agents	Increase degreasing temperature, increase chemical concentration, extend treatment time, increase injection pressure
Impaired effectiveness of the chemical due to new release agents	Discuss with material and chemical supplier

#### 1.1.2. After etching, the surface becomes discolored, stained or milky/cloudy

Likely cause	Recommended solutions
Milky oxidation products on the surface due to poor etching attack	Increase etching temperature, increase chemical concentration, increase injection pressure
Insoluble, dark etching slurries on the workpiece	Increase rinsing times, check the conductivity of the rinsing water, extend pickling time
Insoluble alloy components from the metal in the etching bath	Milder etching (reduce concentration, time and temperature)

#### 1.1.3. The conversion layer forms stains, dry edges

Likely cause	Recommended solutions
Dried residues from the pre-treatment on the workpiece	Extend rinsing time, check conductance of the rinsing fluid



Stains on coated workpiece

### 1.2. Phosphating of steel and galvanized steel

#### 1.2.1. Rinsing water forms beads, insufficient wetting

Likely cause	Recommended solutions
Insufficient degreasing effect due to poorly soluble oils/greases, high-temperature release agents, cured release agents	Increase degreasing temperature, increase chemical concentration, extend treatment time, increase injection pressure
Impaired effectiveness of the chemical due to new release agents	Discuss with material and chemical supplier

#### 1.2.2. Phosphate layer not sealed, corrosion

Likely cause	Recommended solutions
Composition of the bath NOK	Check bath values, if necessary prepare new bath
Incorrect system parameters	Check parameters, observe manufacturer specifications
Heavily contaminated rinsing baths (carryover)	Check conductance and dripping water, replace rinsing baths if necessary
Insufficient rinsing effect	Increase rinsing times, check/clean spray nozzles

#### 1.2.3. Phosphate layer too thick, dusty

Likely cause	Recommended solutions
Excessively long treatment times	Adhere to manufacturer specifications, avoid interruptions

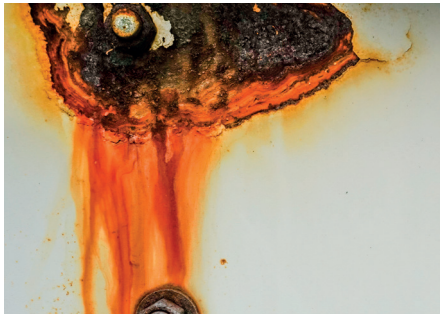
#### 1.2.4. Uneven, spotty phosphate layer

Likely cause	Recommended solutions
Not sufficiently degreased	Increase degreasing time and degreasing temperature, increase concentration; check whether new release agent was used on the workpieces
Insufficient etching	Increase etching time and temperature, increase concentration, sandblast beforehand
Dried-on chemicals	Prevent the chemicals from drying out between treatment zones
Uneven spraying (spraying systems)	Check nozzles for clogging, check for defects

**1.3. Mechanical pre-treatment**

**1.3.1. Bimetallic corrosion/galvanic corrosion**

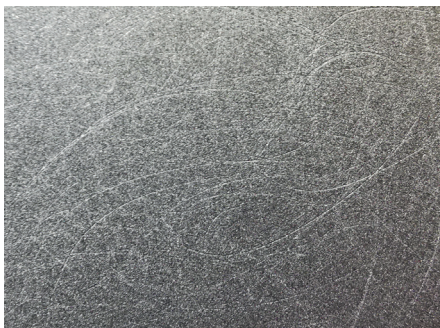
Likely cause	Recommended solutions
Corrosion due to contact with various metals	Never use blasting agents containing iron/steel on chrome steel or aluminum; do not use the same abrasive paper first on steel and then on aluminum; do not use steel rivets for aluminum, do not use aluminum rivets for steel



Bimetallic corrosion/galvanic corrosion

**1.3.2. Grinding traces/sanding marks**

Likely cause	Recommended solutions
Preliminary work carried out with abrasives that are too coarse	Use suitable sandpaper or grit size; do not skip more than one grit size
Blasting pressure too high / abrasives too sharp	Select suitable pressure, change abrasive



Grinding traces

**2. Coating**

**2.1. Fluidization**

**Description:** Fluidizing the powder enables the injector or pump to feed the powder through the powder hose to the pistols as gently and evenly as possible. For this purpose, the powder is put into a state of suspension. The surface of the fluidized powder should move slightly, but should not exhibit air bubbles, holes or powder fountains. Furthermore, no powder should be blown out of the container.

**2.1.1. Poor fluidization (holes/air channels in the fluidized surface)**

Likely cause	Recommended solutions
Insufficient fluidizing air volume	Increase the fluidizing air volume
Fluidizing bed defective or clogged	Clean or replace fluidizing bed
Water or oil in the compressed air (powder sticks to the container)	Check compressed air, use oil separator
Temperature too high	Cool the room and compressed air
Excessive fine fraction from recycling	Increase fresh-powder content



Holes/air channels in fluidized surface

**2.1.2. Poor fluidization (blistering/powder leaks from the container)**

Likely cause	Recommended solutions
Excessive fluidizing air volume	Decrease the fluidizing air volume



Blistering in fluid container

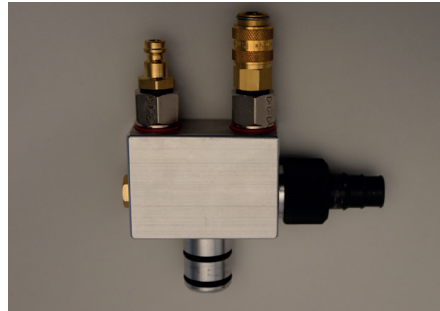
**2.2. Powder deposits in the powder hose**

**Description:** The powder is not conveyed evenly through the powder hose and is deposited inside it. This leads to a build-up that is then ejected suddenly from the powder hose. This results in irregularities in the coating thickness and visible spitting on the surface.

Likely cause	Recommended solutions
Worn collector nozzle	Check or replace collector nozzle
Insufficient proportion of dosing air	Reduce powder quantity, increase total air quantity
Unsuitable hose routing	Avoid kinks and tight curve radii
Hose constriction	Check hose for constrictions due to cable ties or similar
Powder hose too long	Shorten hose or increase total air volume
Powder hose diameter too small	Select larger diameter for increased powder output



Grounded powder hose

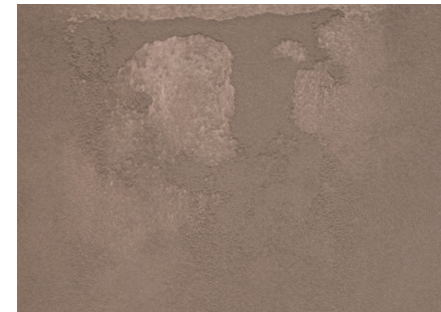


Example of an injector

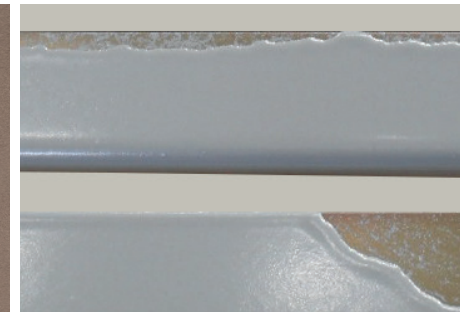
**2.3. Powder falls off before curing (poor transport adhesion)**

**Description:** The powder does not adhere to the surface after spraying or falls off when slightly shaken.

Likely cause	Recommended solutions
Inadequate grounding	Clean hooks (bare metal) and measure the resistance to ground (>1 MOhm)
Insufficient charge	Check actual values, increase voltage, increase current limit
Powder output too high, resulting in insufficient charging of the powder	Reduce powder output
Excessive total air or triboelectric air volume, resulting in blow-off effects	Reduce air settings
Insufficient gun distance, resulting in blow-off effects and insufficient charging	Check distance and high-voltage values
Coating thickness too high	Reduce coating thickness
Conveyor runs unsteadily	Check conveyor system



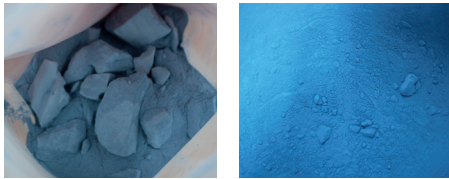
Powder falls off after spraying



**2.4. Clumping tendency in the carton / fluid container**

Description: Solid lumps have formed in the powder box or fluid container.

Likely cause	Recommended solutions
Incorrect storage (temperature too high) Feeding from powder carton	Reduce storage temperature / sieve off powder Only switch on the vibration plate if necessary, avoid continuous operation
Temperature of fluidizing air is too high	Check compressed air
Excessive pressure at pumps or pinch valves	Check pressure / insert screens
Excessive pressure during storage	Do not stack powder sacks
Powder expiration date expired, stored for too long	Observe expiry date (label), use new powder



Clumping tendency in powder carton or fluid container

**2.5. Poor penetration behavior into edges and cavities**

Description: Layers on inside edges and in cavities are not sufficiently thick or the powder cannot be applied there.

Likely cause	Recommended solutions
Incorrect air values, therefore blow-off effects	Adjust air values, ensure a "soft" powder cloud
Excessive powder output	Reduce powder output
Inadequate grounding	Check suspension and grounding
Voltage too high / electric field too strong	Adjust voltage, set lower current limit, insert ion-leakage rings
Insufficient distance between the components	Increase spacing
Non-coatable structures	Adapt structure



Insufficient coating thickness in inner edges

**2.6. Coating thickness**

**2.6.1. Coating thickness too thick**

Description: After curing, the powder coating surface is uneven and wavy (orange peel skin) or contains needle sticks.

Likely cause	Recommended solutions
Workpieces are too hot during coating	Let parts cool down for longer (approx. 40°C)
Excessive powder output	Adjust powder quantity
Unfavorable workpiece geometry / suspension (powder remains on horizontal surfaces)	Adjust suspension
Insufficient pistol spacing	Increase spacing



Excessive coating thickness can lead to orange peel skin

**2.6.2. Coating thickness too thin**

Description: The substrate is still visible after curing; granular surface characteristics.

Likely cause	Recommended solutions
Inadequate grounding	Clean hook (bare metal) and measure grounding
Insufficient powder charging	Increase voltage setting and current limit
Insufficient powder output	Increase output, check collector nozzles
Clogged suction pipes/injectors in powder container	Check pipes and injectors
Inadequate triboelectric charging	Check powder for triboelectric suitability, increase triboelectric air
Application facility (pistol, cables, control units, ...)	Check pistols and cables
Spray distance too large	Reduce distance
Incorrect hose material	Select a grounded hose



Coating thickness is visible after curing

**2.6.3. Uneven coating thickness**

Description: The coating thickness is visibly (or only measurably) uneven.

Likely cause	Recommended solutions
For short strokes: irregular pistol spacing, incorrect stroke setting	Measure and adjust pistol spacing, adjust stroke (rule of thumb: stroke= pistol spacing up to approx. 50mm)
With long stroke: incorrect sine curve	Adjust stroke speed and height (if necessary, consult the plant manufacturer)
Irregular feed / powder ejection	Check fluidization, powder hoses and collector nozzles
Uneven manual coating	Train personnel accordingly
Inadequate grounding	Clean hook (bare metal) and measure grounding

**2.7. Deposits on the spray nozzle**

Description: During the coating process, powder or effect agent accumulates at the nozzle slot and then detaches and is visible on the coated part after curing as an inclusion or elevation on the cured surface.

Likely cause	Recommended solutions
Worn nozzle slot	Check or change slot
Worn nozzle attachment	Check or change attachment
Excessive powder output	Reduce powder quantity
With baffle plate: insufficient purge air	Adjust purge air settings
With effect powder coating: electrostatic charge too high	Remove ion-leakage rings
With effect powder coating: incorrect powder hose	Use grounded hose material



Deposits caused by sintering on the spraying nozzle



### 3. Cured surface

#### 3.1. Spitting on the surface

Description: Local elevations of powder or inclusions of effect agent are visible on the surface.

Likely cause	Recommended solutions
Insufficient fluidization	See 2.1 Fluidization
Powder deposits in the powder hose	See 2.2 Powder deposits in the powder hose
With effect powder coating: incorrect powder hose, resulting in sintering in the powder hose	Use grounded hose material
Powder building up on the spraying nozzle	See 2.7 Deposits on the spray nozzle
Uneven powder feeding	Adjust conveying and dosing air



Spitting on the surface

#### 3.2. Cratering

Description: Usually circular flaws on the surface through which the substrate is visible.

Likely cause	Recommended solutions
Insufficient pre-treatment, chemical residues	Check the parameters, contact the manufacturer
Silicones/moisture on the surface	Clean/dry surfaces, check for dripping from the conveyor
Residues from sprays, creams, ...	Test/replace products
Contaminated coating plant	Thoroughly clean the plant
Carryover from other powder coatings	Thoroughly clean the plant
Outgassing (substrate/powder coating/...)	Temper the part, observe curing parameters
Finishing with putty and wet coatings	Check for suitability, temper component
Oil in ambient air/compressed air	Check filters
Clean the first coating with solvents	Temper component, allow solvent to evaporate



Visible substrate on coated surface due to cratering

**3.3. Pin-holes**

Description: Ultra-fine holes (pores) in the coating surface with a significant local reduction in surface gloss.

Likely cause	Recommended solutions
Curing temperature/heating rate too high	Increase heating up-time, lower curing temperature
Moisture content of powder coating too high	Check storage conditions, dry the powder
Overcharging of the powder	Reduce coating thickness/voltage, use current limiter
Air inclusions/outgassing	Temper, adjust curing conditions
Insufficient pre-treatment, chemical residues	Check the parameters, contact the manufacturer



Needle sticks in coating surface

**3.4. Picture frame effect**

Description: Visible change in the surface finish around the edges

Likely cause	Recommended solutions
High voltage, spray current too high	Reduce voltage, limit current
Excessive wrap-around	Adjust high voltage, pistol distance and total air
Excessive feed/coating or over/under-running of the pistols	Adjust settings to suit the respective workpieces or hangers
For fine-structure powder coatings: inconsistent separation	Use current limiter, insert ion-leakage rings



Picture frame effect at edges

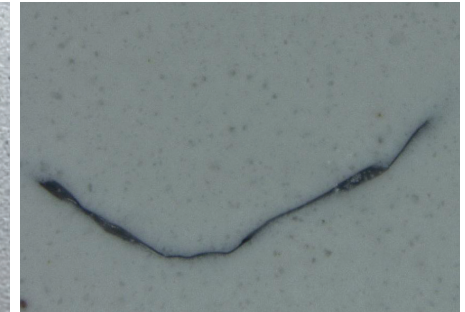
**3.5. General impurities**

Description: Impurities or inclusions are visible on the cured surface.

Likely cause	Recommended solutions
Splitting off from the cyclone	Check cyclone for sintering, clean to remove granulate
Dirt sucked into the booth during recycling	Ensure clean room air, use screens during recycling
Dirt from the environment	Pay attention to cleanliness
Residual powder from previous color change still in circulation	Clean booth and powder circuit more thoroughly; observe the plant manufacturer's specifications
Fibers from cleaning cloths, work clothes, etc.	Use suitable cleaning material, if possible use lint-free work clothing



General contamination

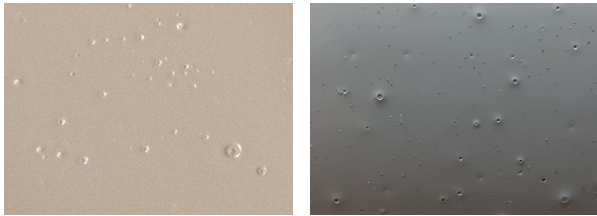


Contamination from fibers

**3.6. Blisters**

Description: Visible blisters or large craters caused by burst bubbles in the cured powder coating.

Likely cause	Recommended solutions
Water/oil under the coating layer	Dry/clean workpieces thoroughly
Outgassing from the substrate	Ensure correct galvanization/pre-treatment, temper workpieces, use outgassing-friendly powder coatings
Finishing with putty and wet coatings	Check for suitability, temper component
For blasted parts: avoid degreasing before sand-blasting	First degrease, then sandblast

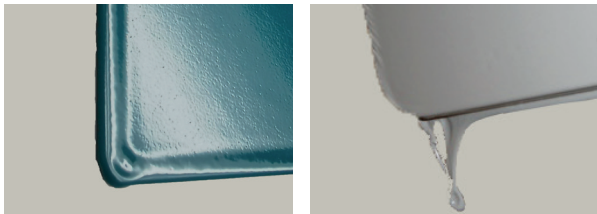


Blistering on the cured powder coating

**3.7. Edge and droplet formation**

Description: Thick edges or even droplets have formed on the edges of the work piece.

Likely cause	Recommended solutions
Coating thickness too thick	Reduce coating thickness
Excessive temperatures/heating rates	Check furnace temperature
Workpiece temperature too high	Allow to cool sufficiently
Workpiece edges too sharp	Deburr edges



Thick edges or droplets on the edges

**3.8. Wetting impairments**

Description: Insufficient adhesion of the powder during coating; tearing of the powder coating during melting and lack of adhesion to the substrate of the cured component.

Likely cause	Recommended solutions
Insufficient pre-treatment	Check pre-treatment and rinsing parameters, avoid interruptions
Carried over oil/grease	Ensure pre-treatment baths are clean
Contaminated workpiece surface	Only touch pre-treated workpieces with clean gloves
Retention time in the furnace is significantly too long	Observe curing parameters



Wetting impairments due to insufficient adhesion of the powder

**3.9. Irregular fine structure**

Description: The structure is not fine and uniform; visible streaking and cloud formation on the surface.

Likely cause	Recommended solutions
Coating thickness too high	Reduce coating thickness
Excessive electrostatic charge	Reduce voltage, lower the current limit Recommendation: Insert ion-leakage rings
Uneven powder ejection	Check fluidization, air settings
In case of stripes: Insufficient spraying distance	Increase spraying distance



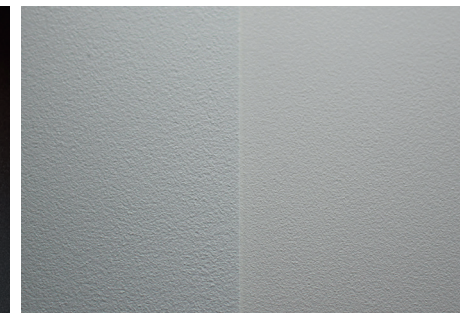
Irregular fine structure

**4. Surface characteristic**

**4.1. Color deviations (uni-color shades)**

Description: Deviating shades on the component itself or in comparison to the master sample/standard.

Likely cause	Recommended solutions
Coating too thin (substrate visible)	Increase coating thickness
Over-curing of the surface	Observe correct curing conditions; perform furnace measurement
Different curing conditions	Pay attention to the respective curing conditions
Materials of differing thickness in the furnace at the same time	Check hangers and furnace settings
Workpieces pre-treated incorrectly (stains on the substrate)	See 1.1 Pre-treatment of aluminum
Metamerism (influence of light on color perception)	Perform assessment under indirect sunlight, use daylight lamps (d65)
Fluctuating gloss levels (visually darker shade)	See 4.4 Fluctuating gloss levels
In case of yellowing: directly heated gas furnace	Use indirectly gas heated furnace
Different workpieces	Ensure uniform workpieces (steel, aluminum, etc.)
Contamination with other powders	Clean system thoroughly, use fresh powder



Color deviations in uni-color shades

4.2. Color deviations (effect powder coatings)

4.2.1. Color deviations compared to the master sample/color chart

Description: The shade of the workpieces differs visibly from that of the master samples or color charts.

Likely cause	Recommended solutions
Batch variation	Use only powder from one batch per job, for master samples use powder from the same batch
Different application parameters	Make a note of the settings and use them for subsequent coating, use IGP-Effectives®
Recycled portion too large or inadmissible	Increase fresh powder content, coat at a loss
Different coaters/plants	Use one system/coater only per job, use IGP-Effectives®
Inadequate grounding	Clean hook (bare metal), measure grounding



Color deviations from effect powder coatings

4.2.2. Fluctuating effects

Description: Fluctuations in the effect on the workpiece itself or between individual workpieces.

Likely cause	Recommended solutions
Changed high voltage/electrostatic charge	Use the same settings, coat exclusively with or without ion-leakage rings
Inconsistent fresh powder dosage	Automated dosing of fresh and recycled powder
Coating started with fresh powder; recycled powder used for further coating	Before the start of coating, convey a small amount of powder through the recycling system and add it to the fresh powder
Uneven manual coating	Train personnel accordingly; perform manual pre-coating
If there is a color difference between the front and back of profile sections: Spraying distance is too small, powder output is too high	Increase distance and reduce powder quantity
Irregular powder feeding	2.1 Fluidization and 2.2 Powder deposits in the powder hose, check for a "soft cloud"
Powder feeding from containers	Use a fluid container
Separation of powder and effect agent	Reduce high voltage, reduce total air volume

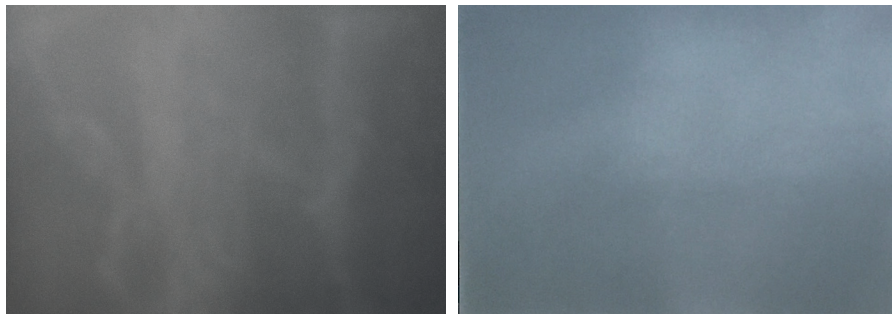


Color deviations due to effect variations

**4.2.3. Streaking and cloud formation**

Description: Visible streaks and/or cloudy irregularities in the effect formation.

Likely cause	Recommended solutions
Insufficient spraying distance	Increase spraying distance
Excessive powder output	Reduce powder output, check for "soft cloud"
Uneven follow-up coating	Train personnel accordingly; perform manual pre-coating
Total air volume too high	Increase spray distance, check for "soft cloud"
Inadequate grounding	Clean hook (bare metal) and measure grounding
With long stroke: incorrect sine-curve settings	Adjust stroke height/speed and conveyor speed in accordance with pistol spacing (consult plant manufacturer)
Defective pistol	Check the coating plant, voltage



Visible streaks and/or cloudy irregularities

**4.3. Lack of opacity**

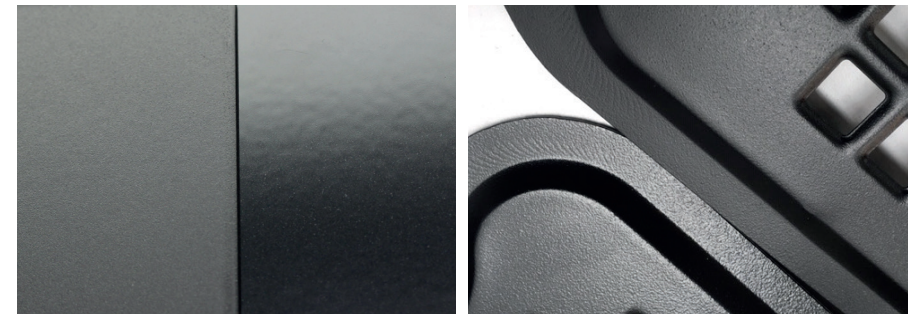
Description: After coating, the substrate is still visible.

Likely cause	Recommended solutions
Coating thickness too thin	Increase coating thickness, observe minimum coating thickness
With long stroke: incorrect sine-curve settings	Adjust stroke height/speed and conveyor speed in accordance with pistol spacing (consult plant manufacturer)
For short strokes: irregular pistol spacing, incorrect stroke setting	Measure and adjust pistol spacing, adjust stroke (rule of thumb: stroke= pistol spacing up to approx. 50mm)
Natural color of the substrate (brass, steel, aluminum)	Increase coating thickness
Surface of the substrate visible (sanding, blasting)	Reduce surface roughness, prepare surface more evenly

**4.4. Fluctuating gloss levels**

Description: Differences in the level of measured or visible surface gloss on a workpiece or in comparison to other workpieces.

Likely cause	Recommended solutions
Incorrect curing conditions (powder over/under-cured)	Check range of curing conditions, perform furnace measurement
Materials of very different thickness in furnace at same time	Adjust hangers, perform furnace measurement
Powder stored for too long or at an excessively high temperature	Improve storage conditions, use new powder
Recycled portion too large	Increase fresh-powder content
High voltage / charge too low	Increase voltage, set current limiter to higher value
Excessive/irregular coating thickness	Reduce coating thickness



Differences in measured or visible surface gloss on coated workpieces

## 5. Film properties

### 5.1. Mechanical properties

#### 5.1.1. Cracking, chipping of the surface

Description: The values specified in the data sheet for ball impact, cupping test or mandrel bending test are not achieved.

Likely cause	Recommended solutions
Incorrect furnace settings (paint over/under-cured)	Check range of curing conditions, perform furnace measurement
For multi-layer construction: incorrect process	Observe the applicable processing instruction
Insufficient pre-treatment	Check pre-treatment parameters

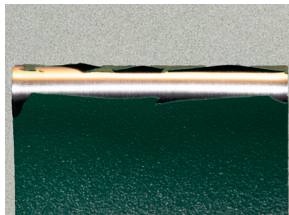
#### 5.1.2. Flaking, peeling of the coating layer

Description: The powder coating detaches from the substrate by itself or under mechanical stress.

Likely cause	Recommended solutions
Incorrect furnace settings (paint over/under-cured)	Check range of curing conditions, perform furnace measurement
For multi-layer construction: incorrect process	Observe the applicable processing instruction
Absence of primer	Observe the specifications in the technical data sheet
Oils/grease/release agents on the surface	Clean/pre-treat surface thoroughly
Rust/dust on the surface	Clean/pre-treat surface thoroughly
For laser-cut parts: lack of pre-treatment of the cut edges	Mechanically process laser-cut edges (grinding, blasting)
For aluminum: lack of pre-treatment (insufficient pickling removal, inadequate degreasing)	Increase pickling removal >1.5g/m <sup>2</sup> , improve degreasing
Primer fully cured	Only allow primer to gel, observe applicable processing instruction
In case of intermediate adhesion loss: directly heated gas furnace	Use indirectly heated gas furnace/electric oven
Excessively long storage before finishing	Carry out finishing within 24 hours



Chipping on coating layer



Peeling of the coating layer

### 5.2. Other properties

#### 5.2.1. Conductive properties

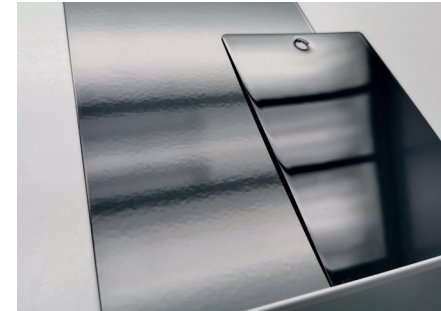
Description: The surface resistance is too low / too high.

Likely cause	Recommended solutions
Coating thickness too thin/thick	Increase/reduce coating thickness
Incorrect measuring method:	Perform measurement in accordance with DIN EN 61340-2-3, perform measurement with electrodes, maintain electrode distance
Incorrect powder coating	Use conductive powder coating (11th digit: "C") Example: 331SA70350C00

#### 5.2.2. Flow

Description: The surface appears wavy and is not smooth.

Likely cause	Recommended solutions
Incompatibility with other powders	Clean plant / use fresh powder
Coating thickness too thick	See 2.6.1 Coating thickness too thick
Insufficient pre-treatment	Adjust pre-treatment parameters / contact manufacturer



Surface appears wavy

## 6. Keyword index

Term	Explanation
<b>A</b> Abrasion resistance	The powder coating is not scratched due to mechanical stress (by cardboard, paper, etc.)
Accumulation	Powder accumulation in or around the coating booth or on the workpiece
Additive	Additive in powder coating to adjust or improve the properties
Adhesion water dryer	Furnace for drying of the workpieces after pre-treatment
Adhesive strength	Describes the adherence of one material to another; during coating, the adhesion of the powder coating to the substrate
Anodizing	Anodized oxidation of the aluminum substrate, similar to the anodizing process but without compression; for optimal corrosion protection
Application	Process of applying a powder coating to the workpiece by means of coating equipment; can be automated or manual
<b>B</b> Bimetallic corrosion	Results from the use of different metals
Binder	A primary component of the coating; usually polyester, epoxy, acrylic or mixtures of these
Blisters	Sealed elevation in the powder coating film caused by outgassing
Blooming	A typically white film on the cured coated surface that can be wiped away
Buchholz hardness	Standardized test method for measuring surface hardness in accordance with DIN EN ISO 2815
<b>C</b> Chalking	Decomposition and fading of the coated surface due to weathering
Charging	Electrostatic charging of particles or powder via corona or triboelectric charging
Cloud formation	Local cloud-like irregularities in the effect formation in metallic powder coatings
Coating thickness/density	Measurable thickness of the coating on the substrate
Color change	Cleaning of the entire coating plant to allow subsequent coating with a different color
Color deviation	Difference in shade between sample and component or between different components
Color standard	Color shade as standardized by institutions (RAL, NCS, Pantone, etc.)
Color/shade	Perceived color due to incident light with different wavelengths

Contamination	Undesirable substances (dust, fibers, etc.) in the coating system and powder coating
Conveying air	Supply air in the injector that is used to regulate the powder quantity; in plants with total air control it is regulated automatically depending on the set powder quantity
Conveyor/conveyor chain	System that moves the component or the suspension trolley through the coating system
Corrosion	Reaction between metal and oxygen accelerated by the presence of salt, water or intense heat
Crack	Visible breakage of the powder coating, usually caused by insufficient cross-linking
Cratering	Flaw in the powder coating caused by tearing of the powder coating during the curing process or a burst blister
Cross-linking	Curing of powder coating during the retention time in the furnace
Cyclone	System within the powder circuit that separates the overspray powder from the extracted air
<b>D</b> Deaeration additive	Powder additive used to avoid blisters or similar on exhalating substrates
Deburring	Rounding of cut edges with a minimum radius of 2 mm
Dip pre-treatment	Chemical pre-treatment method in which the parts are immersed in a bath filled with chemicals
Dosing air	Supply air in the injector for regulation and homogenization of the powder feeding in the powder hose; this is regulated automatically in plants with total air control
Downtime	Unwanted shutdown of the system due to malfunctions or troubleshooting
Downward trickling	Powder trickles/falls in small quantities from the workpiece; no laminar detachment occurs
Duroplast	Plastic or coating that cannot be deformed again after cross-linking, even at high temperatures
DW rinsing	Rinsing with demineralized water (conductivity max. 20 µs/cm) during pre-treatment
<b>E</b> Edge loss	Withdrawal of the powder from the edges during melting; insufficient coating thickness at the edges
Edge structure	Accumulation of powder on the outer edges of the workpieces
Electrogalvanizing	Chemical application of a zinc layer on the component as corrosion protection; the zinc layers are thinner than those created via hot dip galvanizing
Electrostatic charge	Electrical charge generated by the high voltage at the coating pistol, and the associated charging of the powder



End filter	Fine filter for particles that were not separated by the cyclone
Etching	Chemical removal of oxide layers, rust or scale from the metal surface
Etching slurries	Slurries produced by the etching process
<b>F</b> Faraday cage	Electrostatic phenomenon that makes coating in cavities and inner edges difficult
Filiform corrosion	Thread-like corrosion of aluminum; especially prevalent on damaged areas of the coated surface or cut edges in the presence of air with a high salt content
Fine fraction	Proportion of fine powder grains (<10µm) in the powder coating
Finishing	Coating an object/workpiece
Flaking	The cured powder coating detaches from the workpiece at low load
Flow	Describes the smooth surface characteristics of the powder coating
Fluidizing	The powder is brought into a "liquid/suspended" state by means of compressed air
Fluidizing bed	A container that has a fluidizing membrane at the bottom, through which the fluidizing air can flow into the container or powder
Foaming	Planar, fine-pored blistering due to greatly increased coating thickness or heating up too quickly
Formation of droplets	During melting, the powder coating runs off the edges of the workpiece in the form of droplets
Fresh water rinsing	Rinsing cycle with fresh tap water to remove chemical residues during pre-treatment
Furnace	Device used for heating or cross-linking of the powder by means of different energy sources (electric, gas, oil, infrared)
<b>G</b> Galvanizing	Application of a zinc layer on steel as corrosion protection
Glass transition point (Tg)	Temperature range in which the powder begins to soften
Gloss	Ability of a surface to reflect incoming light
Grain distribution/grain spectrum	Indicates the ratio between the sizes of the individual powder grains
Gray film	Optically visible decomposition products or deposits on the cured powder coating film, which can be wiped away
Grounding	Conductive electrical connection between components or the coating object and the ground connection; measurement and resistance values in accordance with EN 50177

<b>H</b> Hangers	Frame, rod or rail for suspension of the workpieces to be processed
Heating rate	The time in which the workpiece is heated in the furnace from the ambient temperature to the required object temperature
High-voltage blowback	Star-shaped defects in the uncured powder coating due to a lack of grounding
Hot-dip galvanizing	Zinc coating applied via a dipping process as corrosion protection
<b>I</b> Incompatibility	Impairment of the coating surface caused by other substances/powders in the coating layer
Infiltration	Penetration of water and oxygen between the substrate and the coating layer, and the resulting corrosion
Injector	Compressed-air-operated device used to feed the powder from the container through the powder hose
Inter-coat adhesion	Adhesion between two coating layers in a multilayer structure
<b>L</b> Loosening	Softening of the coating surface due to solvents or temperature
Lumps	Solid lumps of powder, which may be caused by pressure, temperature or vibration
<b>M</b> Maintenance	Regular servicing of all system components by the manufacturer
Material thickness	Thickness of the substrate to be coated
Mechanical properties	Measurable properties of the paint surface via standardized mechanical tests for flexibility, adhesion, etc., (e.g., Erichsen cupping, ball impact, mandrel bending test, etc.)
Metallic effects	Powder coatings with added metallic pigments
Metallic pigments	Effect pigments added to the powder coating to achieve special surface characteristics: mica, chrome effects, etc.
Metamerism	Differing perception of the same color caused by different light sources
<b>N</b> Needle sticks	Fine-pored impairment of the cured powder coating due to outgassing or overcharge effects
Nozzle	Attachment for the coating pistol, available in different versions, usually flat spray or baffle-plate nozzles
<b>O</b> Object temperature	Temperature that the component must reach in the furnace to ensure proper curing; the retention time starts when this temperature is reached
Opacity	Ability of the coating to mask the shade of the substrate with the intrinsic color of the coating

Orange peel skin	Visible, wave-shaped interference pattern on the coated surface
Outgassing	After curing: visible blisters/cratering or needle sticks in the surface; caused by gases that have migrated through the powder coating during curing
Oven graph	Recording of the temperature curve in the furnace
Over-curing	Curing of the workpiece in the furnace at an excessively high temperature or for an excessively long retention time
Oversize particles	Powder particles that are larger than the desired grain spectrum and are screened out
Overspray	Excess powder paint that is sprayed but did not adhere to the workpiece during the coating process
Oxide layer	Sealed corrosion layer on a metallic substrate
<b>P</b> Penetration behavior	Describes the penetration of the coating powder into inner edges, cavities and recesses during the coating process
Picture frame effect	Visible surface deviation (gloss, flow, structure formation) around the edges of a component
Pigment	Material used to color the powder coating
Powder center	Component of the fresh-powder feeding system, which includes the powder/fluid container and the injectors
Powder circuit	Powder that is not deposited on the workpiece is collected and conveyed back into the powder container to be resprayed
Powder feeding	Transport of the powder from the container to the pistol or from the recycling system back into the container
Powder hose	Hose through which the powder-air mixture is transported from the injector to the coating pistol
Powder puffs	Powder lumps on the coating layer, caused by deposits that have come loose from the spray nozzle
Pre-anodizing	See <i>Anodizing</i>
Pre-treatment	(Chemical or mechanical) cleaning and passivation of the substrate
Purge air	Air used to clean the electrode in flat spray nozzles and the baffle plate in baffle-plate nozzles
<b>R</b> Recycling	Operating mode of coating plants that makes it possible to reuse overspray powder in the coating process
Residual powder	Powder residues from recycling, prolonged storage, etc. that are no longer usable for the coating process

Resistance	Imperviousness of the coating to mechanical, chemical, physical or weather influences
Resistance to ground	Describes the measured resistance between the workpiece surface and the ground connection
Retention time	Time during which the workpiece remains in the furnace after it has reached the required object temperature
Reversal point	Turning point of automatic pistols during the up and down movement
Runners	Nose or droplet-shaped drainage pattern on the coating during the melting process
Rust	Colloquial term for corrosion on iron or steel parts
<b>S</b> Sanded area	Visible impairment of the paint film due to mechanical pre-treatment of the substrate, e.g. sanding
Screen/screening machine	System used to sieve the powder coating; also possible with ultrasound
Separating agents	An agent used in the production of injection-molded parts to prevent sticking in the mold
Sieve analysis	Simple method for rough determination of the powder-particle size
Sine wave pattern	Pre-configured movement of the coating pistols over the component in accordance with the conveyor speed, pistol spacing and stroke speed
Solvent resistance	Imperviousness of the cured powder coating to changes caused by applied solvents
Specks	Inclusion of visible, non-meltable dirt particles in the powder coating
Spitting	See <i>Powder puffs</i>
Spots	Visible elevations on the coating surface
Spray pre-treatment	Chemical pre-treatment in which the chemicals are applied by spraying
Streaking	Elongated irregularities in the coating thickness or the effect appearance of metallic powder coatings
Structure	Visible, non-smooth surface characteristics
Substrate	Material of the workpiece to be coated, e.g., steel, aluminum, wood, plastic
Surface impairment	Visible defects in the powder coating
Susceptibility to scratches	Inability of the powder coating to withstand friction or scratches
Sweep blasting	Special, gentle blasting process for galvanized substrates
<b>T</b> Tempering	Preliminary tempering of exhalating substrates
Thermo-plastic	Deformable plastic or coating that becomes soft again at high temperatures



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