Guidance note on the use of metallic effect powder coatings

Foreword

This guidance note was developed by the Technical Committee - Powder Coatings of the Powder Coatings group of the German Paint Industry Association (VdL) in 2003 and 2004, to inform users of metallic effect powder coatings. These effects can be produced by metallic effect pigments of any composition.

1) Introduction

These powder coatings can be used in both interior and exterior applications with varied product profiles and surfaces (e.g. gloss, structure). Since powder coatings are industrial products, which are subject to certain fluctuations as a result of industrially produced raw materials and production processes, recommendations for their use and information about the properties of metallic effect powder coatings are provided here.

Metallic effects arise through reflection and absorption of light on the metallic effect pigments contained in the paint. Difference in appearance and/or effects can be achieved through the type, quantity and orientation of these pigments.

2) Colour/effect

Metallic effect powder coatings are formulated and tested against colour references under reproducible laboratory conditions. Matching of wet paint samples can give rise to differences because of differences in raw materials and the behaviour of the metal effect pigments in the film. Also, it is not possible to match every colour/effect reference for every area of application. Details should be agreed beforehand by the parties involved in such cases.

For the matching of a colour/effect, samples demonstrating the colour variance limits are agreed by the manufacturer in consultation with the customer. For a manufacturer's standard products their own standards are valid. Even with the most careful work methods, colour and/or effect variations cannot be avoided in the production of some batches.
Process-specific colour fluctuations at the coater cannot be covered in the assessment of the powder coating as supplied. A test on receipt under standardised conditions is therefore recommended.
Assessment carried out under guidelines for solid-colour powder coatings is not applicable to metallic effect powder coatings.

Overcoating (e.g. with clear lacquers, repair coatings) leads to an alteration in the overall effect.

3) Use

In addition to the usual application parameters for all powder coatings which lie outside the influence of the powder coating supplier, for metallic effect powder coatings attention should be given in particular to the following points, in which 'non-bonded' (dry blend) powders are often more sensitive. The type and degree of the effect can have a considerable influence:

a) Workpiece

- Different geometries
- Earthing (including partial) / jigging
- Orientation of the main visible surface
- Distance between and to suspended pieces
- Substrate material (aluminium, steel, zinc, ceramic, galvanised substrates, glass, …)
- Pre-treatment

b) Application

- Type of coating line (booth type, conveyor, fluidisation, ...)
- Type of spray equipment (guns, ...) including nozzles (flat jet, round jet, …)
- Set-up of spray equipment (voltage, current restriction, air flows, reciprocator speeds, manual coating, distance to workpiece, …)
- Changing between different application methods (corona, tribo, ...)
- Film thickness

c) Recycling

- Type of reclaim system (cyclone, cartridge...)
- Not using reclaimed powder
- Continuous dosing of virgin powder. With all metallic effect powder coatings, a constant ratio of virgin to recycled powder should be maintained.

d) Curing

- Heat-up rates (convection, radiation, material thickness, track speed, ...)

To avoid unacceptable colour/effect variations it is recommended that these factors are fixed before commencement of coating and then controlled constantly during coating. For special requirements, samples demonstrating colour variance should be generated by the coater under production conditions and agreed with the end user.

If necessary any problem areas on the workpiece should be “pre-coated“. Subsequent recoating can lead to colour/effect deviations. In pieces to be coated on both sides, the main visible side should be coated last.

The assembly of coated pieces, which have been coated under different application conditions, should be avoided. The same applies for coated pieces made using products from different suppliers or powder coating ranges.
For the repeat coating of jobs the coater must advise the powder coating supplier of the special requirement for colour/effect constancy.

A suitable, non-abrasive packing material should be selected for the storage and transport of coated pieces. Direct contact between coated pieces is to be avoided.

4) Cleaning and resistance to chemicals

The cleaning of metallic effect powder coated surfaces is in general more difficult than for solid-colour coatings. Furthermore the cleaning properties and chemical resistance depend upon several factors, e.g.

- Composition of the powder coating
- Type and concentration of the cleaning medium or chemicals
- Type and condition of the soiling

When cleaning, attention must, without exception, be paid to the manufacturer’s datasheet (powder coating and cleaning agent) and the applicable guidelines of the various associations (e.g. GRM).
Abrasive cleaning agents are not advised.
Soiling should be removed as promptly as possible to avoid lasting damage to the coating.

For high specifications the cleaning properties, chemical resistance and protection against mechanical damage can be improved by application of a suitable clear topcoat.

In every case the resistance against chemicals must be clarified with the manufacturer.

5) Safety

Under the current extent of knowledge metallic effect powder coatings represent no higher safety risk in use than solid-colour powder coatings. All relevant statutory regulations and the safety datasheet are to be observed.

6) Disposal of waste powder

On disposal of waste powder pay attention to local regulations and the safety datasheet. The European waste number is as for standard powder coatings.

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