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Anodized effects with powder coating

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Anodized effects with powder coatings

FreiLacke has worked together with pigment manufacturer Merck KGaA (Darmstadt, Germany) to develop powder coating series PP7001K, a new coating system with anodized colours. The established colours from the anodizing of aluminium served as the basis for the colour shades. As the coatings are based on polyester, components with this powder coating are particularly suitable for outdoor applications.

To protect aluminium against corrosion, a protective oxide layer is produced by anodic oxidation. This anodized layer is very hard and scratch-resistant; however, it is also very brittle, which is why work-pieces must be fully shaped before they are anodized.

Furthermore, the process costs of the anodizing process are relatively high. This is why there have been frequent attempts to replace the anodized layer with a powder coating. Visually, the oxide layer has a very matt, velvety surface. The colour of the oxide layer can be changed using colouring metal salts in the electrolyte or by using organic or inorganic dyes.

General Product Description

A pure polyester-primid system was selected as the matrix material to simulate the anodized colours. Matting of pure polyester-primid powder coatings has always been tricky because the addition of waxes or fillers produces a gloss level of only approx. 45 GU (angle 60°).

To achieve a gloss level of 15-25 GU, a special method must be used – the dry-blending technique. This involves mixing two powder coatings together. The two components mainly differ in their reactivity. During curing, a microstructure develops due to the different reaction rates of the two components. This leads to diffuse light-scattering on the surface of the coating, thus producing a matt effect. The challenge here is to produce a surface appearance that, in spite of the microstructure, is smooth, well-levelled and virtually pixel-free. The polyester dry-blend base was developed further by FreiLacke and was chosen for the anodised colour shades thanks to its velvety surface.

Manufacture

The colour shades were all produced with the bonding process. A very high-quality pearlescent pigment system was chosen for this product. The advantage of these pigments over aluminium bronzes is their high abrasive resistance and resistance to weathering. The basic pigment system was formulated in collaboration with Merck KGaA (Darmstadt) and optimised by FreiLacke.

The manufacturing process for the metallic powder coatings was also optimised for this application. As the pearlescent pigments are liable to disintegrate during the bonding process, a special gentle method was developed that reduces pigment damage.

Properties of the powder coating system

The colour shades were matched to those of the EURAS colour fans. The gloss level of the colour shades lies between 18 and 29 GU (angle 60°). They have a homogeneous, matt, velvety surface appearance that closely matches that of the EURAS fans.

The optimum baking conditions for this product are 10 minutes and an object temperature of 180 °C. The system exhibits high flexibility against subsequent deformation, both on steel and on aluminium (see Figure 1 and Figure 2).

Since the pigmentation is purely pearlescent, abrasive wear does not produce black discoloration, which makes it suitable for use on office furniture. The colour shades are also highly resistant to chemicals and cleaning agents.

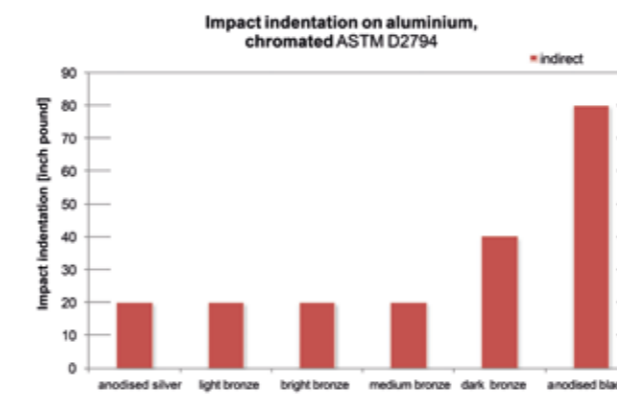


Figure 1: Mechanical stability on aluminium

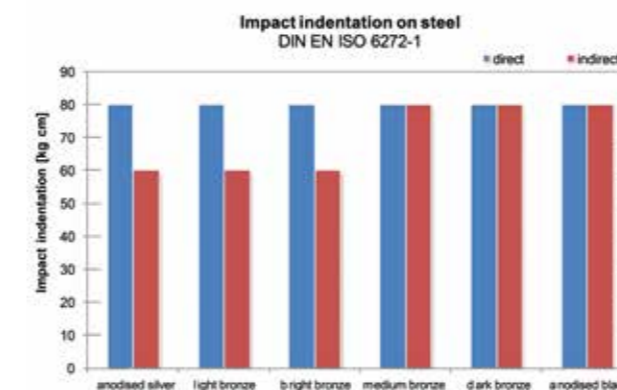


Figure 2: Mechanical stability on steel

Resistance to weathering (Figure 3) lies at the standard GSB level (300 h / >50 % residual gloss), which means that it can be used in industrial outdoor applications.

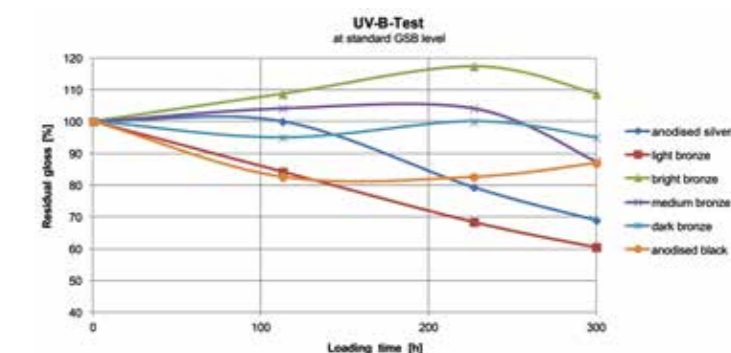


Figure 3: QUV-B test using the GSB method

Powder coatings with the anodized effect are available in a 25 kg box or 2.5 kg minipack ex warehouse:

ANODIZED SILVER	PP7001KE1870
SLIGHTLY BRONZE	PP7001KE1871
LIGHT BRONZE	PP7001KE1872
MID BRONZE	PP7001KE1873
DARK BRONZE	PP7001KE1874
ANODIZED BLACK	PP7001CE1875