Metallic Effect Pigments for Automotive Coatings

Sparkle Silver® Premier
Sparkle Silver Ultra™
Platinum Silver™
for over 40 years, has been committed to the development and supply of the highest quality aluminum effect pigments to the automotive industry. Through our advanced manufacturing technologies, our aluminum pigments provide automotive stylists and coatings formulators with brighter and more dazzling metallic effects as well as superior degradation resistance. Because of Silberline’s reputation for supplying the highest quality aluminum pigments, our products have for these many years been formulated into automotive coatings and have contributed to the elegance and overall design impact of motor vehicles.

The aesthetic effect achieved by an automotive coating depends in part on pigment particle size, pigment shape, and the degree and method of polishing the flake, all of which contribute to the coating’s brightness, sparkle and metallic travel.

Silberline is proud to offer the following product lines to meet your styling and performance needs: Sparkle Silver®, Premier, Sparkle Silver Ultra™ and introducing our new Platinum Silver™ line.

“ AquaTech Solutions” For Waterborne Coatings

Silberline has developed two “world class” inhibition technologies including our SilBerCote® AQ and AquaPaste® product lines. For more information on our SilBerCote AQ and AquaPaste products or to request a copy of our “AquaTech Solutions” brochure, contact your local Silberline sales office or visit our website at www.Silberline.com.
A Wide Range of Metallic Effect Pigments for Automotive Coatings

Sparkle Silver® Premier (SSP)

Though fineness and brightness typically trend in opposite directions with aluminum pigments, Silberline designed the flakes in Sparkle Silver Premier pigments to have more uniform surfaces, smoother edges and controlled particle size distribution. This unique “Silver Dollar” technology broke the “fineness or brightness” paradigm and gave designers whiter, brighter and cleaner polychromatic effects. Silberline’s Sparkle Silver Premier grades include SSP 354, 454, 554 and 695.

Sparkle Silver Ultra™ (SSU)

Sparkle Silver Ultra grades are highly polished, extremely bright lenticular flakes, offering a smooth patina at the fine end of the spectrum and a narrow particle size distribution. SSU grades allow the formulator to create very smooth, brilliant masstones or clean, vibrant colors. Sparkle Silver Ultra pigments are designed to achieve the highest level of metallic effects and creativity and include SSU 6704, 6756, 6605 and 6555. More recent innovative additions to the Sparkle Silver Ultra line include SSU 7908, 7807, 7806 and 6656.

Introducing Platinum Silver™ (PS)

Platinum Silver is the newest addition to Silberline’s superior line of silver dollar type pigments offering a highly polished appearance with exceptional brightness, excellent opacity, a “high flop index,” and a more silky smooth patina. Silberline’s “new” Platinum Silver aluminum pigments provide a wide range of metallic effects from bright silver to chromatic and include PS 008, 010, 012, 014, 016 and 018.

Please consult the following tables for a product that meets your requirements.

All of the information used for comparing aluminum pigments was generated from coatings applied over metal utilizing Bell-Bell electrostatic equipment with dual-axes control capabilities.

The above graphic details the effect of median particle size and Particle Size Distribution (PSD) on the brightness and degradation resistance properties among our more sophisticated families of effect pigments. “Head on Brightness” (HOB), or amount of colorless light reflected at the near specular L*15 angle, increases not only with increasing D50 between grades in any particular family, but is also shown to increase from one family to the next, at the same median particle size, as the particle size distribution narrows.

Degradation resistant aluminum pigments provide consistent metallic appearances in automotive coatings that are subjected to the shearing forces associated with OEM recirculation systems. By carefully selecting the proper raw materials, controlling the median particle size, and narrowing the PSD, we were able to develop grades that demonstrate dramatic improvements in resistance to circulation damage. This is illustrated in the above graph by the increased slope of the trend lines for the “HOB after Circulation” values between families.
Aluminum effect pigments are plate-like particles with directional light reflectance and/or scattering characteristics. They present variation in lightness (colorless reflection) or saturation (chroma) with changes in the viewing angle.

The brightness of these effect pigments can be described as lighter, brighter, grayer and darker, all of which are related to particle size and particle size distribution. The lightness is measured by integrating the amount of colorless light reflected back from the surface of the flakes, using a reflectometer or goniospectrophotometer, and given a numeric value $L^*$ on the $L^*a^*b^*$ color scale.

When we speak of particle size, we generally mean the average (median) diameter of the flakes, expressed as the D50. For most new automotive coating applications, the D50 usually falls within the range of 8–25 microns. Generally speaking, the smaller particles yield better hiding, appearance, and improved distinctness of image (DOI). The larger particles yield higher sparkle and brightness.
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Comparison by Metallic Travel and Flop Index

The above graphic ranks the products in order of greatest to least Travel and also includes the corresponding Flop Index for each grade.

Coatings containing aluminum pigments have the ability to reflect varying intensities of light with changes in observation angles. Generically speaking, the observational angles are grouped into three categories: “Face” (near specular), “Mid Specular” (or diffuse), and “Flop” (far specular) and correlate to the instrumental viewing angles on a goniorspectrophotometer as follows:

- Near specular - 15 or 25 degrees
- Mid specular - 45 degrees
- Far specular - 75 or 110 degrees

(Instrumental angles are determined by reference to the specular angle which is 45 degrees from normal.)

The particle size distribution (PSD) is equally as important as the average particle size. The PSD is defined as the range in particles sizes from the smallest to the largest. The PSD is usually a Gaussian curve; however, special processes may yield a narrower range or a translated distribution.

As a rule, a grade that has a broad distribution will consist of both more fine and large flakes. A grade with more “fines” will have improved opacity but will be darker on the face angles and lighter on the flop angles. A grade that has a narrower or more controlled distribution will appear brighter on the face and darker or “cleaner” on the flop angles. This clean appearance allows for better chromatic color development in tint bases.

Precisely controlled grades such as PS and SSU can be designed to have a smoother patina* or yield greater sparkle depending on median particle size.

*Patina is an attribute of aluminum pigments described as the smoothness or silkiness (fineness) of the pigment grain. It is a visually subjective comparative term that is used to express the appearance of coatings and described by expression such as coarse, grainy, medium, fine, smooth and silky.

Metallic travel is described as the difference in extent to which the “Face” (also synonymous with HOB) appears a bright silver chroma when compared to the darker, grey “Flop.” The mathematical expression is given by

$$T = L^*_{15} - L^*_{110}$$

Another expression for the observed changes in intensity is given by the Flop Index. The Flop Index is the measurement of the change in reflectance of a metallic color as it is rotated through the range of viewing angles. A flop index of 0 indicates a solid color, while a very high flop metallic basecoat color may have a flop index of 15–17. Flop Index is mathematically defined by:

$$FI = 2.69 \frac{(L^*_{15} - L^*_{110})^{1.11}}{(L^*_{45})^{0.86}}$$