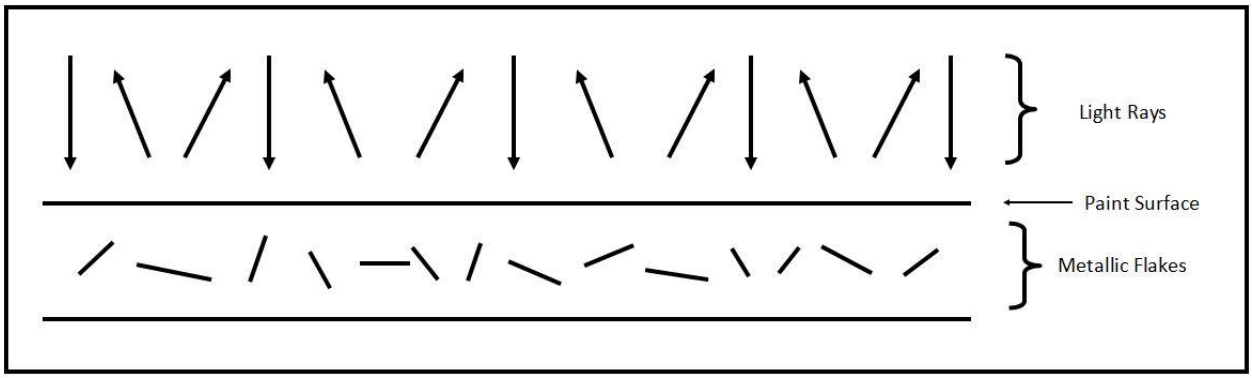
125 Colfax Street
Springdale, PA 15144

Color Variation with Metallic and Mica Pigments

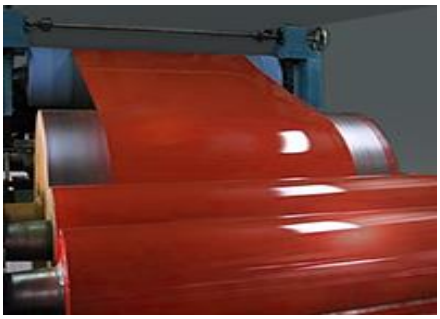
In general, architectural coatings come in solids, mica or metallic colors. Mica pigments are a mineral and give a pearlescent appearance to the coating. Metallic coatings are aluminum metal flakes and have a higher degree of reflectance. Their random orientation within a paint film creates a glitter affect by reflecting or bouncing off incoming light in different directions.

Specifically, coatings containing metallic flake pigment will have variations in the level of brightness, i.e. dark and light areas. The reflective property of the metallic flakes means that the same metallic painted surface will look different depending on the viewing angle, the angle of the light source (e.g. the sun) and the intensity and type of light source. In addition, the general orientation/directionality of the metallic flakes in the paint will also affect the brightness of the color. This characteristic is sometimes referred to as the "flop". To better understand the optical dynamics of metallic paints, it is helpful to think of the flakes as tiny mirrors. The flakes that lie horizontal in the paint film will reflect the most light. In an optimally applied metallic paint, the flakes all lay perfectly random. This will achieve the greatest level of "sparkle" and depth.



This situation can be exaggerated by application methods and technology differences. Coil coating applications for wall panels orient the mica and metallic flake in a different way than spray coatings will for aluminum extrusion. Coil applications tend to lay down the flake horizontally in one direction while spray will orient the flake in many directions do to the turbulent atomization process through spray guns, discs and bell application equipment.

Coil Coater



Spray Application

Extrusion coatings are also sprayed at film thicknesses up to 70% greater than those used in coil coatings, meaning that there is more film for the effect pigments to occupy. This ultimately influences how those pigments will orient (lay or agglomerate) within each respective coating; and how they look.

The mica and metallic appearance can also be different when comparing liquid to powder coatings. First, liquid coatings tend to be much smoother than powder coatings based on the ability of liquid coatings to be reduced with solvent to achieve the desired appearance. Powder coatings have much thicker films and are unable to be altered during application. Micas can be added at much higher levels in liquid than in powder coatings and powder coatings are on average three times thicker films than liquid. For these reasons, the mica and metallic appearance is different between the two coatings.

It is common for clients to use similar PPG Coil and Extrusion colors on the same building structure. Coil and extrusion coatings are often color matched separately without knowing they are on the same building structure. It is important to match the colors the way they are applied at the factory. Coil coatings would be applied with a drawdown bar to simulate a roll coat application and extrusion coatings would be applied by spray gun or turbo disc or bell. There would be two separate color codes for coil and aluminum extrusion. While there may be subtle, yet discernable differences when viewing these coatings side by side, (due to variables in film and application), most of the time these colors will harmonize very well together, especially when viewed from street level. *However, it is still important that clients determine for themselves if these colors will work for their specific projects.* It is always good practice to have both color matches be done together, by the same paint company, to raise the probability of a successful color match.

AAMA 2605 has recognized this variability of these coatings and suggests a maximum deviation in color of 2ΔE per ASTM D2244, Appendix XI.1. between the approval source and the applicator. They also recommend final color approval should be with actual production line samples rather than laboratory prepared panels.

Common instruments for color analysis do not offer reliable, consistent correlation between numerical readings and visual appearance for metallic and pearlescent containing colors. Historically these limits were setup on a visual basis and not by color instrument means.

There is currently no universally accepted standard for production color variation in the industry, however for the reasons described above, some variation is expected.

Coating Comparisons

	Solid Colors	Micas	Metallics
Coats	2 - Coat	2-3 coat	3-4 coat
Clear Coat	Optional	Optional	Mandatory
Appearance	Solid	Pearlescent	Reflective
Cost	Low	Medium	High
Color Consistency	Best	Better	Good

Coil vs. Extrusion

	Coil	Extrusion
Application	Roll Coated	Sprayed
Flake Orientation	Flat	Scattered
Film Thickness	Precise	Variable

Liquid vs. Powder

	Liquid	Powder
Mil Thickness	1.0-1.5 mils	2.5-5.0 mils
Mica/Metallic	Utilize both	Solids & Micas
Layers	1-4 coats	1-2 coats