ChromaFlair®
COLOR SHIFTING PIGMENT

VIAVI Solutions

Application Note

Paint Formulation Guidelines

ChromaFlair light interference pigment is composed of very flat, smooth flakes with an average aspect ratio of 12:1 and is highly reflective and specular.

These two attributes lead to the high chromaticity and hue shifts that characterize ChromaFlair® pigment. The pigment is inorganic in nature and is composed of three common raw materials: aluminum, magnesium fluoride and chromium. Propylene glycol n-propyl ether is used as a wetting agent to reduce dusting during weighing and mixing of the pigment.

All eight standard colors of ChromaFlair pigment are manufactured from the same three raw materials. All colors have an aluminum metal core. This highly reflective layer serves two purposes. It provides the reflective surface necessary for light interference, which produces the highly chromatic color shift characteristic of ChromaFlair pigments. Secondly, the reflective aluminum layer provides hiding by reflecting light prior to reaching the substrate.

Dispersion

The shape and features of the ChromaFlair pigment flake need to be considered when dispersing to form a pigment paste or slurry. Milling or crushing of the flake can lead to breakdown in the flake and/or distortion of the planar surface of the flakes. The recommended dispersion method is to incorporate the pigment into the dispersion medium with a high speed, low shear disperser. Sand or media mills are not recommended for processing. Blending will be sufficient to disperse and wet the individual flakes. ChromaFlair pigment is readily dispersible in most vehicle systems. Once dispersed, ChromaFlair pigment remains in a stable suspension. Settling may occur over time, as with other pigment dispersions, due to the fact that the specific gravity of ChromaFlair pigment is higher than the dispersion vehicle. ChromaFlair pigment does not hard settle but is soft and loose and is easily reincorporated into the dispersion vehicle with minimal agitation.

Settling may be improved through several methods: increased system viscosity, dispersants, thixotrophs and other settling aids. Increased system viscosity provides greater resistance to the low shear forces acting on the pigment during storage. Dispersants are effective due to their structure. One end of the dispersant is attracted to the surface of the pigment particle while the other end, usually a long chain polymer, provides steric hindrance. Thixotrophic agents such as clay, silica and cellulose acetate butyrate form three-dimensional structures through hydrogen bonding, thus providing steric hindrance.

Loading

The hue shifts and chromaticity of ChromaFlair pigment depend on the interaction of light with the pigment surface. Most paint formulations are blends of several colors and types of pigments to produce the desired color and/or appearance effect. ChromaFlair pigment is often referred to as a "stir in" pigment and has been found compatible in a wide range of standard formulations. It can be blended with aluminum, carbon black, and other inorganic and organic pigments to create a wide range of color effects.

Desaturants such as micas, aluminums and carbon black will affect the L* (lightness value) and will decrease the chroma of the formulation. See the hiding application memo for further information on pigment interactions

and hiding. Small amounts of aluminum flake and/or carbon black may be added to improve hiding power accompanied by some sacrifice in chromaticity.

Transparent pigments are favored since they permit the interaction of light with the surface of ChromaFlair pigment surface. The addition of pigments similar to the face color of ChromaFlair pigment will deepen the saturation of the face color while shifting the flop color to a less chromatic position.

Addition of pigments similar to the flop color to ChromaFlair pigment will desaturate the face color while intensifying the chromaticity of the flop color.

The thickness of the individual flakes, thus the number of flakes per unit weight (grams), varies depending on the color of ChromaFlair pigment. Silver/Green 060, the thickest flake, is 2.6 times thicker than Gold/Silver 080, the thinnest pigment. In an equal weight of sample, Gold/Silver 080 will contain 2.6 times as many individual pigment particles. The larger number of flakes translates to improved hiding power and reduced pigment loading.

Loading level of ChromaFlair pigment will depend on several factors including substrate, applied film thickness, hiding requirements and other pigments in the paint system. In general, levels of 1% to 12% by weight (based on total solids) of ChromaFlair pigment are recommended for most formulations.

Table 1 lists guideline levels for each of the eight standard ChromaFlair pigment colors for various applications. These levels will produce varied substrate coverage resulting in a range of color effects. A basecoat loading provides opacity and the most spectacular color shift effect. A midcoat loading applied over an opaque basecoat can provide dramatic color shifts at reduced pigment loading. Tintcoat loading is used to provide a subtle color shift over an opaque basecoat or substrate.

Color	Basecoat	Midcoat	Tintcoat
Gold/Silver 080	4.99%	2.4%	0.6%
Red/Gold 000	5.5%	2.7%	0.7%
Magenta/Gold 330	5.7%	2.8%	0.7%
Purple/Orange 300	6.0%	3.0%	0.8%
Blue/Red 280	6.3%	3.1%	0.8%
Cyan/Purple 230	9.0%	4.5%	1.2%
Green/Purple 190	10.3%	5.2%	1.3%
Silver/Green 060	11.7%	5.9%	1.5%

Table 1. ChromaFlair Pigment Loading Guidelines

Application

ChromaFlair pigment is well suited to all types of spray application. Basecoat/clearcoat and tricoat systems have been formulated using solventborne, waterborne and 2-component refinish systems. Manual or automatic spray guns may be used with or without electrostatic assistance. ChromaFlair pigment is non-arcing and is well suited to electrostatic application.

Solventborne

Solventborne basecoats can be prepared by blending resins, pigment dispersions, additives, and the solvents necessary to adjust total solids and/or package viscosity. ChromaFlair pigment may be added as a pre-wetted powder or as prepared pigment slurry.

Waterborne

Passivation may be necessary to prevent gassing due to interaction of the aluminum layer of the ChromaFlair pigment with the waterborne system. Several manufacturers supply passivators to the paint industry. Organic acid phosphates have been tested successfully by VIAVI Solutions Inc. For further information, see the passivation application memo.

The information presented in this application memo is based on current data. Periodic updates are provided. Please see your ChromaFlair pigment representative for the most recent edition.

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