ChromaFlair®
COLOR SHIFTING PIGMENT

VIAVI Solutions

Application Note

WRS Wetted Paint Formulation Guidelines

ChromaFlair® WRS Wetted light interference pigment is composed of very flat, smooth flakes with an average aspect ratio of 12:1 and is highly reflective and specular. The WRS grade is encapsulated and can be directly incorporated into waterborne formulations absent of a passivation step.

ChromaFlair pigment is inorganic in nature and is composed of three common raw materials: aluminum, magnesium fluoride and chromium. A sol-gel encapsulation layer allows ChromaFlair WRS to be directly incorporated into waterborne systems without needing passivation. In addition, a silane surface treatment is added for a better humidity performance. Propylene glycol monomethyl ether is used as a wetting agent to reduce dusting during weighing and mixing of the pigment.

Ten 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 disruption to the encapsulation layer. The recommended dispersion method is to incorporate the pigment with a high speed, low shear disperser. Sand or media mills are not recommended for processing. Once dispersed, ChromaFlair pigment remains in a stable suspension. Settling may occur over time because the pigment specific gravity is higher than the dispersion vehicle. However, ChromaFlair pigment is easily reincorporated into the dispersion vehicle with minimal agitation.

Settling may be reduced through several methods: increased system viscosity, dispersants, and thixotropic anti-settling aids in cautionary amounts to avoid adverse impact on appearance. 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.

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 colorants to produce the desired color and/or appearance effect. When introducing ChromaFlair to a formula it is recommended to prepare a slurry consisting of a portion of the resin, accompanying solvent, ChromaFlair and an amine. This step will promote the full incorporation of ChromaFlair when

introduced to the bulk of the formula, reducing the risk of seeding or agglomeration. The slurry step also assists the introduction of ChromaFlair to the system's resin in the absence of any surface modifiers or rheology modifiers potentially present in the bulk formula while also bringing up the pH close to that of the system where the ChromaFlair will be used. The slurry may also include other aluminums of interest intended to be used within the finished product.

Table 1 illustrates an example of the slurry makeup.

Part	Percent
System Resin	>30%
System Solvent	>30%
ChromaFlair WRS	Variable
pH Modifier	<5%

Table 1. Example ChromaFlair Slurry Guideline

ChromaFlair can be blended with aluminum, carbon black, and other inorganic and organic pigments to create a wide range of color effects. Desaturants such as aluminums and carbon black will affect the L* (lightness value) and will decrease the chroma of the formulation. 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. Likewise, the addition of pigments similar to the shift color will desaturate the face color while intensifying the chromaticity of the color at angle.

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 2.7 times thicker than Gold/ Silver 080, the thinnest pigment. In an equal weight of sample, Gold/Silver 080 will contain 2.7 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 color, dry 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 2 lists guideline levels for each of the ten 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 greater opacity and the most spectacular color shift effect. A mid-coat loading applied over an opaque basecoat can provide dramatic color shifts at reduced pigment loading. Each ChromaFlair WRS color has a different solvent content and must be considered with calculating the dry pigment load

	Dry Pigment/Dry Binder	
Color	Basecoat	Mid-coat
Gold/Silver 080	0.20	<0.04
Red/Gold 000	0.20	<0.04
Magenta/Gold 334	0.25	<0.05
Blue/Red 280	0.25	<0.05
Cyan/Blue 225	0.30	<0.06
Cyan/Purple 230	0.40	<0.08
Silver/Blue 160	0.45	<0.09
Green/Purple 190	0.45	<0.09
Black/Red 315	0.45	<0.09
Silver/Green 060	0.50	<0.10

Table 2. ChromaFlair Pigment Loading Guideline

Application

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.

Electrostatic Bell Application

In the case of electrostatic application of ChromaFlair containing formulas, it is recommended to spray using higher than average bell speed. Promoting better atomization allows the ChromaFlair flake to orient in a more desirable manner to interact with light and achieve the maximum intended effect. By varying the fluid flow delivery on a two-pass basecoat application to provide higher volume on the first coat and lower volume on the second, a brighter flash can be achieved. VIAVI recommends a 60:40 ratio between basecoat 1 and 2.

For additional formulation and application guidance, please contact your VIAVI Solutions Account Manager or Customer Service.

VIAVI Solutions

Americas +1 800 254 3684
Europe +33 1 30 81 50 41
Asia Pacific +86 512 6956 7895
E-mail ospcustomerservice@viavisolutions.com

cfwrspaintforms-osp-an-ae
30179821 001 0521