

# ChromaFlair® Pigment Paint Formulation Guidelines



ChromaFlair pigment is suited for all types of spray application. Basecoat/clearcoat and tricoat systems have been formulated using solventborne, waterborne, and two-component refinish systems. The pigment is non-arcing and manual or automatic spray guns with or without electrostatic assistance may be used. Waterborne systems may require passivation to prevent gassing.

## Loading

Loading levels depend on several factors including the substrate, applied film thickness, hiding requirements, and other pigments in the paint system. JDSU recommends levels of 1 – 12 percent by weight (based on total solids) of pigment for most formulations.

The table below lists guideline loading levels. 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. Tint-coat loading provides a subtle color shift over an opaque basecoat or substrate.

**Table 1. ChromaFlair pigment loading guidelines**

Color	Basecoat	Midcoat	Tint Coat
Gold/Silver 080	4.9%	2.4%	1.2%
Red/Gold 000	5.5%	2.7%	1.4%
Magenta/Gold 334	5.7%	2.8%	1.4%
Blue/Red 280	6.3%	3.1%	1.6%
Cyan/Purple 230	9.0%	4.5%	2.3%
Green/Purple 190	10.3%	5.2%	2.6%
Silver/Green 060	11.7%	5.9%	2.9%

## Dispersion

The pigment disperses readily in most vehicle systems. JDSU recommends incorporation of the pigment with a high-speed, low-shear disperser. Do not process with sand or media mills.

Once dispersed, the pigment remains in a stable suspension. Slight settling may occur over time, as with other pigment dispersions, and it easily reincorporates into the dispersion vehicle with minimal agitation. Settling can be reduced by increasing system viscosity and by using dispersants, thixotrophs, and other settling aids.

## Hiding

An important function of a paint film is its ability to cover and enhance the substrate to which it is applied. Hiding power, or opacity, is the property of a paint film to prevent the passage of light and thereby to hide the substrate.

Adding either aluminum or carbon black improves overall hiding power but this must be balanced with the resulting loss of chromaticity. The following table shows the impact on hiding with the addition of aluminum (30%) as well as carbon black (10%).

**Table 2. Black/white hiding at 20 ppb (ASTM D344-97 using a black/white contrast strip)**

Color	Masstone	+30% Al	+10% Carbon Black
Gold/Silver 080	1.0 mil	0.5 mil	0.5 mil
Red/Gold 000	1.4 mil	0.75 mil	0.75 mil
Magenta/Gold 334	1.4 mil	0.75 mil	0.75 mil
Blue/Red 280	1.6 mil	0.75 mil	0.9 mil
Cyan/Purple 230	2.0 mil	0.9 mil	1.0 mil
Green/Purple 190	2.5 mil	1.0 mil	1.0 mil
Silver/Green 060	2.5 mil	1.0 mil	1.0 mil

## Primer Color Selection

Selecting an appropriate primer is crucial to the ultimate color and appearance of a paint finish as well as to the amount of basecoat used. The primer should minimize the color difference as a function of film build that can occur in the basecoat while providing a smooth, uniform surface for the basecoat application. An appropriate primer maintains the bright, chromatic look of the pigmented basecoat that is expected at near-normal and grazing view angles. To this end, JDSU recommends light-gray primer colors and primers with a lightness ( $L^*$ ) less than 40.

## Waterborne Gassing

Due to exposure along flake edges, the aluminum core layer in the pigment structure may react with some waterborne paint systems to produce hydrogen gas. Adding a passivator such as an organic acid phosphate to the paint system may reduce the amount of gas produced. Please refer to the MSDS regarding the safe handling of the pigment in waterborne systems.

## Durability

High-performance protective coatings extend the useful lives of many products. The purpose of durability testing is to predict long-term performance of the coating in the service environment. Durability tests are designed to be more intense in exposure and duration than those conditions normally encountered in the service life of the coating. JDSU has evaluated coatings containing ChromaFlair pigment in a variety of tests simulating environmental exposure, circulation resistance, and shelf stability.

**Table 3. ChromaFlair pigment durability results**

Test	Results
<b>Humidity<sup>1</sup></b>	
Adhesion rating, ASTM D3359 (5 = perfect)	4+
Gray scale rating	5
20° gloss retention	>90%
60° gloss retention	>95%
Visual evaluation	No change vs. control
<b>South Florida Weathering ASTM G147; SAE J1976 (Two-year panels/four-year panels/ten-year panels)<sup>2</sup></b>	
Gray scale rating	4-5 to 5
20° gloss retention	>80%/>50%/>30%
60° gloss retention	>90%/>80%/>50%
Visual evaluation	No change vs. control
<b>Waring Blender Test<sup>3</sup></b>	
$\Delta E^*$	$\leq 2$
20° gloss retention	$\geq 99\%$
60° gloss retention	$\geq 99\%$
Visual evaluation	No change vs. control
<b>Heat Stability<sup>4</sup></b>	
Settling	Medium, easily reincorporated
Gray scale rating	5
20° gloss retention	>98%
60° gloss retention	>98%
Visual evaluation	No change vs. control

1. Painted panels are placed in a humidity chamber set for 102°F  $\pm$ 2°F and 93%  $\pm$ 2% relative humidity for 96 hours.
2. Painted panels basecoated with 90% ChromaFlair pigment, 5% carbon black, 5% aluminum, and then clearcoated are exposed at a Miami, Florida exposure site (5° south black box).
3. Pigmented paint is blended at 21,000 RPM for eight minutes with temperature maintained below 110°F. The sample is allowed to recover for 24 hours at room temperature and then sprayed out versus an unblended control.
4. Pigmented paint is placed in a 120°F oven for four days. The sample is allowed to cool to room temperature. The sample is checked for settling with a spatula and is then mixed and sprayed out versus a control that had been stored under ambient conditions.

**Measurement Techniques**

Gray Scale: ISO international standard 105/A02

Color: BYK Spectrogard® d/8° geometry, Ill. D65, 10° observer L\*, a\*, b\*, C\*, hue, and DE\* are measured and recorded.

Gloss: BYK-Gardner Micro-TRI-gloss glossmeter 20° and 60° gloss is measured.

Appearance: MacBeth® SpectraLight II viewing booth visual color difference and coating film integrity is evaluated.