

CUSTOMER SUPPORT

SAMPLE PREPARATION GUIDE

FOR

PAINT AND COATINGS

(DATACOLOR FORMULATION SOFTWARE)

- I Overview
- II Glossary of Words and Terminology
- III Materials to be brought to the User's Course
- IV Sample ratios for primary colorant blends
- V Notes and Suggestions on Primary Preparation
- VI Known formulations to be brought to class

April 3, 2002

OVERVIEW

Datacolor Color Control Systems are designed as working tools that a colorist or shader uses to perform the task of bringing products on shade to a target color or standard. The two most frequently used functions of the many provided in the software are:

1. Developing initial colorant formulations to match a desired target color.
2. Calculating corrections for existing off-color batches to bring the color of the batch on standard.

To implement these functions all colorants must be characterized in a colorant data file. This colorant file will contain information for each individual colorant used in day to day operation.

The instructions contained in this guide must be followed to insure the file will be as accurate as possible. The performance of the system depends on the quality of the data in the file.

PLEASE BE SURE YOU UNDERSTAND THE OBJECTIVES OF THIS GUIDE FULLY BEFORE YOU START YOUR PRIMARY SAMPLE PREPARATION. IF YOU HAVE ANY QUESTIONS ABOUT THESE INSTRUCTIONS, CONTACT YOUR DATACOLOR TECHNICAL ACCOUNT REPRESENTATIVE BEFORE YOU PROCEED!

PRELIMINARY DISCUSSIONS

The first data file you prepare should be for the product line produced most by your company **Proceed through the following steps.**

- A. The first colorant file - Decide which vehicle system or product-line to use for your initial file.
- B. Formulation of primary material - All primary samples should be formulated and prepared as though they were finished products to be delivered to a customer.

Be on the lookout for problems such as “flocculation” along with any of the others that can be encountered. Do a “rub-up” on each sample before curing. Identify and correct any problems such as flooding, flocculation or pigment flotation.

- C. Film application and substrate - All primary samples should be made using the same application methods you now use for color matching. That can be drawn downs, sprayed panels or any other type application. It should be done at normal application film thickness.

Whatever method you use must be reproducible.

PLEASE NOTE: The software does not require the samples be at complete hiding. If any of the colorant samples are not hiding **you must build a file using an incomplete hide white.** If they are not at complete hide, the substrate must have a black and a white contrast section on it large enough to measure with the Spectrophotometer.

You can, of course, make all your primaries at complete hide.

- D. **Primary material sample size** - Sample weighing accuracy directly influences the precision of the data file. Prepare a large enough sample to insure weighing accuracy. Generally a pint sample or larger provides sufficient volume.
- E. **Scale** - We recommend that an electronic balance with a minimum two decimal point accuracy be used when preparing primary samples. One decimal, triple beam balances and the like are not advisable for optimum accuracy. If you have any questions about the reliability of the scale you want to use, please call Datacolor.
- F. **Assembly** - The key is to construct your primaries in a manner consistent with the way the materials are to be used in the formulation process.

If dry pigments are being used, the same dispersion method should be used in the lab that will be used in production. It is recommended you do not co-grind the primary pigment mixtures.

If you use pastes, Be sure they are thoroughly agitated (mixed) and homogenous before use in the primary samples.

- G. **Drying Schedule** - The drying or curing schedule you use should duplicate the process that you currently use for that coating. If a lab sample is force dried, then your primaries should be forced dried.
- H. **Allocating Materials** - The materials needed to prepare primary samples include:

1. **Calibrating White and Black** - You must be sure to allocate enough of the same lots of white and black to complete the file and for future use. This ensures consistency throughout the file or if you wish to store additional colorants in the future.
2. **Primary Colorants** - Quantities of each primary colorant you plan to store in your database. These can be dry pigments, pastes, or both. If you use pastes, be sure the sample you take is homogeneous and representative of the standard formulation of that paste.

Dry pigments should be dispersed separately in the lab and then blended based on the dry pigment amounts.

3. **Vehicle or Clear Base** - A clear (neutral) or zero TiO₂ base, vehicle, must be available. This will be needed for your primary mixes with black unless you are using an intermix system.

For trade sales material - If you do not currently have a clear base in the product line, prepare one by taking your finished white base and preparing a quantity of this material without the white. It must contain all additives and extenders.

4. **Primaries Represent the Product** - This means in every respect. Pigment to binder ratios, loss resin composition, additives, and solvent blend are to be the same as the finished product when they represent.

GLOSSARY

This glossary will give you definitions for the terminology used in this guide. The terminology used in your company may differ from this. This is to let you know the meanings in this guide.

BASE (TRADE SALES PAINT)

A coating or paint mix which is a final product; i.e., in trade sales applications, the white paint to which colorant dispersions are added.

CALIBRATING BLACK

The black paste dispersion or pigment to be blended with each colorant in the file.

NOTE: If more than one black is used in a product line, the calibrating black should be the strongest or jettest of the available blacks even if it is not the one you use in everyday production. Your Working black can be added as just another colorant.

DISPERSION or PASTE

A liquid form of colorant dispersion, paste or flushing used in the actual shading or color matching of your products.

MASSTONE

A sample of your finished product which contains a single colorant only.

ZERO WHITE, NEUTRAL or CLEAR BASE

A finished coating or paint vehicle containing no TiO₂ or other colorants. Extenders, driers, catalysts, etc. are present.

PIGMENT or PASTE DISPERSION (COLORANT)

Material present in a formulation to impart color.

PRIMARY PANEL

A sample used to generate a database or colorant file. Each colorant in the file requires a minimum of two to a maximum of ten primaries for a complete description.

MATERIALS TO BE BROUGHT TO THE USER'S COURSE

It is important that you bring with you a limited data file when you attend the Datacolor User's Course. During the course, you will be instructed how to load, calibrate and troubleshoot this data. Therefore, it is important that all samples be completed prior to attendance.

A. Calibrating white and black primary panels.

Included in these, should be panels representing at least 4 different ratios of calibrating white/calibrating black (these will be explained later in this guide).

B. Primary panels for each colorant.

A minimum of two to a maximum of ten primary panels are required for each colorant. One to nine of the panels should be colorant mixed with the calibrating white. One panel must be the colorant mixed with the calibrating black. For the class it is suggested you prepare at least three panels of the colorant mixed with white.

C. Suggested Colorants for Class

- | | |
|-------------------|---------------------|
| 1. Organic Blue | 5. Inorganic Yellow |
| 2. Organic Green | (Yellow Oxide) |
| 3. Organic Yellow | 6. Inorganic Red |
| 4. Organic Red | (Red Oxide) |

D. Known sample formulations (All 6)

It is advisable to prepare only the samples we suggest in this guide so that you do only necessary work. At our User's Course, your instructor will be able to determine if the work done to date is satisfactory. If it is not, the instructor will inform you what changes must be made in order to get your file in good operating condition. It is also suggested that you prepare two sets of panels, drawdowns or sprayouts so that a backup set is always on hand.

THE DETAILS YOU NEED TO PREPARE THESE MATERIALS ARE FOUND IN THE SECTIONS OF THIS GUIDE TITLED:

“SAMPLE RATIOS FOR PRIMARY COLORANT BLENDS”

“KNOWN FORMULATIONS TO BE BROUGHT TO CLASS”

SAMPLE RATIOS FOR PRIMARY COLORANT BLENDS

FOR COLORANT FILES TO BE USED FOR OPAQUE/TRANSLUCENT PAINTS

The software provides the ability to store data from ten primary samples. From these samples nine sets of K and S values are calculated. After examining the data these samples render during calibration, the decision is made which data sets best characterize the colorant's performance over the range of concentrations represented. These are then activated. All activated sets of K and S values are used in formulation and correction.

REMINDERS:

- A.** All concentrations are percent by weight of the total colorant. **This can be dry pigment or paste. Please Remember: NEVER CO-GRIND DRY PIGMENTS FOR USE AS PRIMARIES. Back calculate dry concentrations from single pigmented pastes if needed.**
- B.** All samples must be prepared as a finished paint system at normal colorant load levels.
- C.** It is not necessary that the samples be at total hiding. If they are not, though, they must be over a black/white substrate. If so, please make sure to bring a panel/card of the blank substrate to class.

SAMPLES TO PREPARE:

The ratios outlined below can be used for dry pigment, paste or volume.

NOTE: MORE SPECIFIC INFORMATION ON DIFFERENCES WHEN LOADING DRY, PASTE, VOLUME OR TRADE SALES WILL BE GIVEN BELOW.

Samples that will be needed for class attendance are as follows:

CALIBRATING (MASTER) WHITE

100% Masstone White (panel of calibrating white).

Do you require the colorant file ability to calculate loading to specified hiding? If so, you must prepare a master white at incomplete hiding over black/white substrate.

Your Account Representative can give you further information on this.

For class we strongly recommend you bring ten letdowns for the black and one colorant of your choosing. For the remaining colorants, please bring AT LEAST four mixtures with white and the mandatory mixture with black. The colorants with ten letdowns will allow us to demonstrate the softwares maximum capabilities. How many you prepare for each colorant when you return home from the class will be discussed during class.

CALIBRATING BLACK (& ADDED BLACKS)

For the calibrating black we request you make **at least four** of the letdowns with white.

2%	black	+98% white
5%	black	+95% white
10%	black	+90% white
20%	black	+80% white
30%	black	+70% white
40%	black	+60% white
50%	black	+50% white
70%	black	+30% white
80%	black	+20% white

Masstone Black (panel of calibrating black). **This sample is mandatory.**

ALL ORGANIC AND INORGANIC COLORANTS

For the colorants we request you make **at least four** of the letdowns with white.

2%	colorant	+98% white
5%	colorant	+95% white
10%	colorant	+90% white
20%	colorant	+80% white
30%	colorant	+70% white
40%	colorant	+60% white
50%	colorant	+50% white
70%	colorant	+30% white
80%	colorant	+20% white
97%	colorant	+ 3% black <u>This sample is mandatory.</u>

These amounts are not written in stone. They are starting points and you may vary them if desired.

OPACITY - If you desire to calculate colorant loading you must make your white at incomplete hiding. The Suggested CR should be between 90 and 95. If you are creating this type of file, it is no longer required that all the primaries always be opaque. Previously opacity was accomplished by loading (sometimes loading above normal levels) or multi-coating of the primary. Please make sure you accurately record the film thickness of the white sample only if loading calculations are necessary and your white is applied at the above stated contrast ratio. If all of your products are applied at the same dry film (such as that which would be achieved with a Bird applicator) we can use a relative value of 1.0.

If, at your normal loading and film thickness, your primary is less than opaque, the software will accommodate this. All primary samples should be made over a black and white background so measurements can be made at incomplete hiding, if necessary.

PLEASE NOTE THAT IT IS NOT IMPERATIVE THAT ALL OF YOUR SAMPLES BE WIEGHED ACCURATELY TO ZERO TO THE SECOND DECIMAL PLACE BUT RATHER THAT YOU KNOW EXACTLY WHAT IS IN THE SAMPLE. PLEASE ACCURATELY RECORD WHAT IS CONTAINED WITHIN EACH SAMPLE. IF YOU HAVE ANY QUESTIONS ON THIS PLEASE CONTACT YOUR TECHNICAL ACCOUNT REPRESENTATIVE.

KNOWN FORMULATIONS (see page 8 for suggested formulations).

NOTES AND SUGGESTIONS ON PRIMARY PREPARATION

DRY PIGMENT CALIBRATION

Dry pigment ratios are the same as paste ratios for all primary samples. Pigments should be dispersed using a method, which duplicates plant dispersion. **They should all be single pigment dispersions and then mixed on the basis of dry pigment amounts.** Do not co-disperse the primary mixtures.

TRADE SALES APPLICATIONS SUGGESTIONS AND REMINDERS

If you are building a colorant file for use in trade sales (where there is more than one base in a product line), follow the instructions below.

- A. Datacolor recommends you use a concentrated white colorant as the calibrating or master white in the file. This allows for a full range of mix with white concentrations without over pigmentation of the system.
- B. All concentrations are percent by weight of paste.
- C. Weight / unit volume must be measured for each base and colorant. If you ultimately desire volumetric output (PAINTMAKER customers see note above), do not use theoretical densities since these are not always accurate.
- D. All samples must be prepared as a finished paint system at normal pigment load level.
- E. It is not necessary that the samples be at total hiding. If they are not, though, they must be over a black / white substrate.

NOTE: Paintmaker file primaries must all be at complete hiding.

- F. It will not be necessary to build a file for each base level in a single product line. The bases in your system will be added to the file. The necessary primary samples to enter and calibrate an additional base are:
 - 1. 100% Base
 - 2. 97% Base + 3% Calibrating Black
- G. **A clear (neutral) or zero TiO₂ base must be available. This is used for your primary mixes with black. Also for the mixes with white using concentrated white as master. If you do not have a clear base in that product line, prepare one by taking your finished white base formula and leaving out the TiO₂.**

PAINTMAKER USERS PLEASE NOTE: Paintmaker, any version, **can not** utilize ChromaCalc 3.0 colorant files. You can utilize ChromaCalc 3.0 for your laboratory and factory. But you will have to maintain your current CC-1 colorant files for use with Paintmaker.

KNOWN FORMULATIONS TO BE BROUGHT TO CLASS

Each data file brought to class must be accompanied by a set of known samples. These samples will be used to verify the accuracy of the data in the file. Each colorant in your database should appear in at least one known sample. All knowns should be prepared using the following guidelines:

1. Each known should contain three colorants and a white.
2. Each colorant should come from a unique hue family. A known should not contain 2 reds, 2 blues, etc.

Prepare samples using the same colorants that are contained in your data file in the following ratios:

KNOWN #1	Inorganic or Organic Yellow	20%
	Red Oxide	10%
	Black	2%
	White	68%
KNOWN #2	Yellow Oxides	4.0%
	Organic Blue	0.1%
	Black	1%
	White	94.9%
KNOWN #3	Inorganic or Organic Yellow	40%
	Organic Blue	8%
	Black	2%
	White	50%
KNOWN #4	Yellow Oxide	20%
	Red Oxide	5%
	Organic Green	5%
	White	70%
KNOWN #5	Inorganic or Organic Yellow	45%
	Red Oxide	45%
	Black	3%
	White	7%
KNOWN #6	Repeat KNOWN #4	