GRACOL & SWOP

INTRODUCTION

Over the past 40 years the evolution of electronic systems in the graphic arts industry, from capture to print, has progressed to a point where all segments of the industry are now dependent on digital technology. The efficiency of operations and the quality of products have reached unprecedented heights, thanks not only to these technologies, but also to the efforts of industry associations in applying specifications, standards and process control to the complex operations involved in color communication and reproduction. The historical background of this effort is briefly reviewed in this introduction.

The history of print specifications in the U.S. began in 1975, when a group of industry leaders from printing, prepress, advertising and publishing gathered to address the problem of inconsistent color reproduction in publications. They assembled a set of best practices that were to become the specifications for web offset publication, or SWOP. These became guidelines across the industry for the preparation of print ready materials, selection of inks, protocols for proofing and parameters for printing. SWOP's efforts are credited with stabilizing color reproduction across an industry where image quality was critical. The basic concepts of SWOP were acknowledged by many other segments of the printing industry to the point where it became a widely emulated, though often misunderstood, brand. Most of the specifications and guidelines in this document have roots in the original work of SWOP. However, as advances in digital technology began to explode in the late '80s and early '90s, it became clear that the basic approach of SWOP had to be taken to a new level.

Partnering with CGATS, the ANSI Committee for Graphic Arts Technical Standards, SWOP began to update and revitalize the meaning of its specifications. Press tests were performed and spectrophotometric measurements were made to "characterize" SWOP printing. The result was the first widely used reference print characterization, which was designated ANSI-CGATS-TR001:1995. Profiles made from this characterization data were used in popular desktop applications and in digital proofing systems, which for the first time enabled accurate simulation of actual press behavior. This success ushered in a new era of accurate color proofing and of the reliable exchange of color information. SWOP became a specification and working group of IDEAlliance in 2005.

GRACoL, founded in 1996 as an outgrowth of the Graphics Communication Association, began to take up a similar banner for general practices in the commercial offset industry. The intent was to do for sheetfed printing what SWOP had done for the web offset publications. Over the next few years, it developed requirements for prepress and print production and conducted research projects aimed at furthering standards in the graphics arts. GRACoL guidelines were published yearly from 1997-2002. Then in 2006, in conjunction with SWOP and under the auspices of IDEAlliance, three new reference characterizations were developed for GRACoL and SWOP. The design of these new datasets incorporated an innovative new calibration methodology, termed G7, which provided a defined neutral scale for common neutral appearance. These datasets, and the G7 calibration method they complemented, were extremely successful in creating a new framework for consistent color communication and reproduction from design to print.

With the continued success of reference characterizations and color managed workflows in the graphic arts, it became clear that adding a few additional datasets could provide a framework that would accommodate essentially all commercial print processes. The development of CGATS-21 in the U.S. and ISO 15339 internationally has resulted in a family of characterized reference print conditions (CRPCs) that form a "process agnostic" basis for color preparations, exchange and reproduction across the industry. These characterizations simplify the work of originators, buyers, preparers and manufacturers by enabling accurate previewing, communication, reproduction and verification of desired color content. The following sections of this chapter discuss details of GRACoL, SWOP and the characterized reference print conditions that are now the foundations of reliable color reproduction based on standards.

GRACoL: THE PREFERRED REFERENCE FOR COMMERCIAL PRINTING

GRACoL is the most prominent of the IDEAlliance datasets and is widely used for print production across many formats. In 1996, following the success of SWOP, a graphics arts task force was formed by the Graphic Communications Association (now IDEAlliance) to develop a document containing general guidelines and recommendations that could be used as a reference source across the industry for commercial sheetfed, four-color, offset printing.

The goal of GRACoL was to formalize a general approach for everyone—from experienced to novice print buyers, designers and specifiers—to work more effectively with their print suppliers. This was successfully accomplished, and the GRACoL Characterization Dataset has since been revised several times. The ongoing mission of GRACoL has been to improve communication and education in the graphic arts by maintaining and updating these guidelines for commercial printing and documenting the impact of new technologies in the commercial offset lithography workflow.

Since 1996, the GRACoL Committee has:

- established subcommittees in many countries around the world;
- worked closely with the Print Properties Colorimetric Council to develop and support the G7 specification as a functional in-

Comparison of GRACoL 2006 (left) and GRACoL 2013 (right).

ternational process control tool, based on shared visual appearance;

- continually supported CGATS in the U.S. and ISO internationally to develop a comprehensive list of print-related standards;

- been more closely aligned with SWOP to produce a comprehensive proofing certification process;

- developed and refined a family of characterization datasets based on G7 to give "shared appearance" to all forms of printing, from full range commercial printing to newspaper reproduction;

- developed the G7 Master, G7 Experts and G7 Certification programs for effective implementation of process control;

- supported the development of GRACoL 2013 and M1 color management workflows; and

- initiated the G7 Process Control training and qualification program.

KEY COMPONENTS OF GRACOL

GRACoL (General Requirements for Applications in Commercial Offset Lithography) is one of the reference print conditions based on G7 NPDC aims. As a reference print condition, GRACoL can be fully represented via standard ICC profiles.

The GRACoL 2006 ICC Profile, like the GRACoL 2006 Dataset, is based on G7 calibration along with solid colorimetry of ISO 12647-2:2004. This version of GRACoL is based on grade 1 paper types that do not contain optical brighteners (OBAs).

The GRACoL 2013 ICC Profile was created using the CRPC6 Dataset of CGATS 21-2. This GRACoL 2013 Dataset, like all CGATS 21-2 CRPC's, is based on G7 calibration and solid colorimetery from ISO 12647-2. The GRACoL 2013 revision is based on M1 measurement and on a grade 1 paper type that contains a specific amount of optical brighteners. In 2010, FTA (Flexographic Technical Association) recommended GRACol 2013 for narrow web flexography.

In addition, there is a GRACoL 2013 UNC ICC Profile, as well as the GRACoL 2013 UNC Dataset (CRPC3 of CGATS 21). This is the first official GRACoL uncoated profile, and it is based on M1 measurements and an uncoated paper stock that contains OBAs.

All three of these GRACoL profiles and their corresponding datasets are available from IDEAlliance (www.gracol.org). Though GRACoL was created as a representation of G7 on a sheetfed offset press, the GRACoL color space is used as the reference for many non-sheetfed commercial print applications, such as web, flexo, gravure, screen and wide-format printing.

The GRACoL working group is continuously working on tools, guides and best practices to help GRACoL users.

DIFFERENCES BETWEEN GRACOL 2006 AND GRACOL 2013

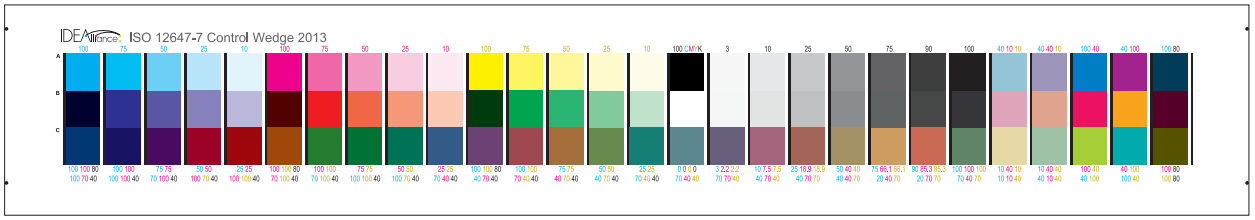
Since 2006, the GRACoL Dataset has been the de facto standard reference print condition for commercial printing and proofing in North America and other regions around the world. To keep up with industry trends, the GRACoL Committee introduced an updated version called GRACoL 2013, which is nearly identical to GRACoL 2006. The few changes are barely visible in most subject matter and should not significantly affect printers, designers or print buyers.

The main difference between GRACoL 2006 and the new GRACoL 2013 Dataset is the white point. The target white point for GRACoL 2006 (95 L*, 0 a*, -2 b*) was based on the legacy ISO 12647-2 standard, which in turn was based on typical commercial printing stocks available in 1994. The GRACoL 2013 white point (95, 1, -4) is slightly bluer, in line with today's typical commercial stocks.

Because the two datasets are nearly identical, most print buyers and designers should see little visible difference. In fact, the differences are smaller than the typical variation between two good offset press runs. To see how small the difference is, open a CMYK image in Photoshop and assign a GRACoL2006-based profile (e.g. GRACoL_Coated1.v2), then toggle back and forth between a profile based on GRACoL 2013, (e.g. GRACoL2013_CRPC6.icc).

ALIGNMENT WITH STANDARDS

In 2013, both international (ISO) and U.S. (CGATS) printing standards were updated in response to industry trends. CGATS 21-2 is a new ANSI (American National Standards Institute) standard, approved in 2013, containing seven "Characterized Reference Print Conditions" (CRPCs) representing seven different printing processes. Because all seven are based on G7 and common ink hues, maximum "shared appearance" is achieved when a common CMYK



IDEAlliance ISO 12647-7 2013 Color Control Wedge.

file is printed on a system calibrated to any of the seven RPCs.

In CGATS 21-2, GRACoL 2013 is known as "CGATS 21-2, RPC-6," while the old 2006 SWOP 3 and SWOP 5 datasets have been combined into a single RPC called "SWOP 2013" or "CGATS.21-2 RPC-5." This reflects the trend of the two legacy SWOP papers merging into a single generic paper type. (IDEAlliance has published an updated SWOP 2013 C5 Profile, which is available on the IDEAlliance website.)

GRACoL 2013 (CGATS 21-2, CRPC-6) was originally intended to align exactly with the solid colorimetric values and TVI (tone value increase) values of ISO-12647-2 Print Condition 1 (PC1). However, ISO12647-2 was not finalized until after CGATS 21-2 was approved, and as a consequence there are very minor differences:

- All measurements used in GRACoL 2013 are specified in M1. This means that GRACoL 2013 calibration and assessment is to be done with M1 instruments. (Note that if substrates do not contain optical brighteners, the M0 and M1 readings are the same.)

- The Cyan, Red and Green solid colorimetric values are slightly different, but the differences (~1dE) are virtually impossible to see in a visual comparison between GRACoL2013 and PC1 of ISO12647-2.

- In the finalized ISO12647-2, black TVI was lowered for simplicity reasons to equal the CMY TVI values of 16%. This change was not incorporated into CGATS.21, partly because it deviates from the natural behavior of typical offset lithography and partly to maintain compliance with the G7 tonal curves in CGATS TR015. Consequently, the black TVI in GRACoL2013 remains at 19%, as it was in GRACoL2006. This difference, while modest, will make some image areas containing black tonal values slightly darker than ISO12647-2.

WHAT THIS MEANS FOR GRACOL USERS

GRACoL 2013 is very similar to GRACoL 2006, so most users will barely see a difference. Because GRACoL 2013 is better aligned with today's premium commercial stocks, printers should find it easier to simulate proofs based on GRACoL 2013 than on GRACoL 2006.

The really good news is that except in rare situations, legacy image files and proofs produced using GRACoL 2006 should not need to be adjusted or converted for printing or proofing to GRACoL 2013 (and vice-versa).

Calibration and verification of GRACoL 2013 requires the use of M1-capable instruments when in the presence of OBA substrates. This means that using GRACoL 2013 in production cannot be done unless you have M1 capable instruments for these situations.

IDEAlliance recommends the following transition:

- If you only have M0 measurement devices, continue using GRACoL 2006.

- If you have M1 instruments, you may choose to move to GRACoL 2013. In the GRACoL 2013 workflow, M1 instruments are to be used for calibration and verification. (M0 instruments can still be used for process control.)

IDEAlliance expects that there will be a period of several years during which printers and premedia providers migrate to new GRACoL 2013-based profiles, while continuing to use the legacy 2006 profiles as needed.

OBTAINING NEW PROFILES

Profiles for GRACoL 2013 (and the other CGATS21-2 reference print conditions) can be downloaded from either www.gracol.org, or the ICC profile registry at www.color.org.

GRACOL AND PROOFING

GRACoL characterization data or profile provide complete information on the reference print condition needed for proofing. A proofing RIP can be used to accurately render the color space based on this information. Every GRACoL proof must contain the IDEAlliance ISO 12647-7 2013 Color Control Wedge.

By measuring this control strip, the resulting proof can be verified using a spectrophotometer and by referencing the data from the reference characterization data. A number of commercial tools are available that allow you to easily verify proofs.

	Paper			C			M			Y			K		
	L*	a*	b*	L*	a*	b*	L*	a*	b*	L*	a*	b*	L*	a*	b*
2006	95	0	-2	55	-37	-50	48	74	-3	89	-5	93	15	0	0
2013	95	1	-4	56	-37	-50	48	75	-4	89	-4	93	16	0	0

	Red			Green			Blue		
	L*	a*	b*	L*	a*	b*	L*	a*	b*
2006	47	68	48	50	-68	25	24	17	-46
2013	47	68	48	50	-66	26	25	20	-46

GRACoL 2006 vs. 2013 Colorimetric Values (changes in red).

GRACOL AND PRESS CALIBRATION

The GRACoL reference print condition is based on using G7 on a sheetfed press with a #1 coated substrate. Other print methods might not match the GRACoL aims as accurately. On a sheetfed press, important GRACoL aims are discussed below and summarized in the chart in Section 12.

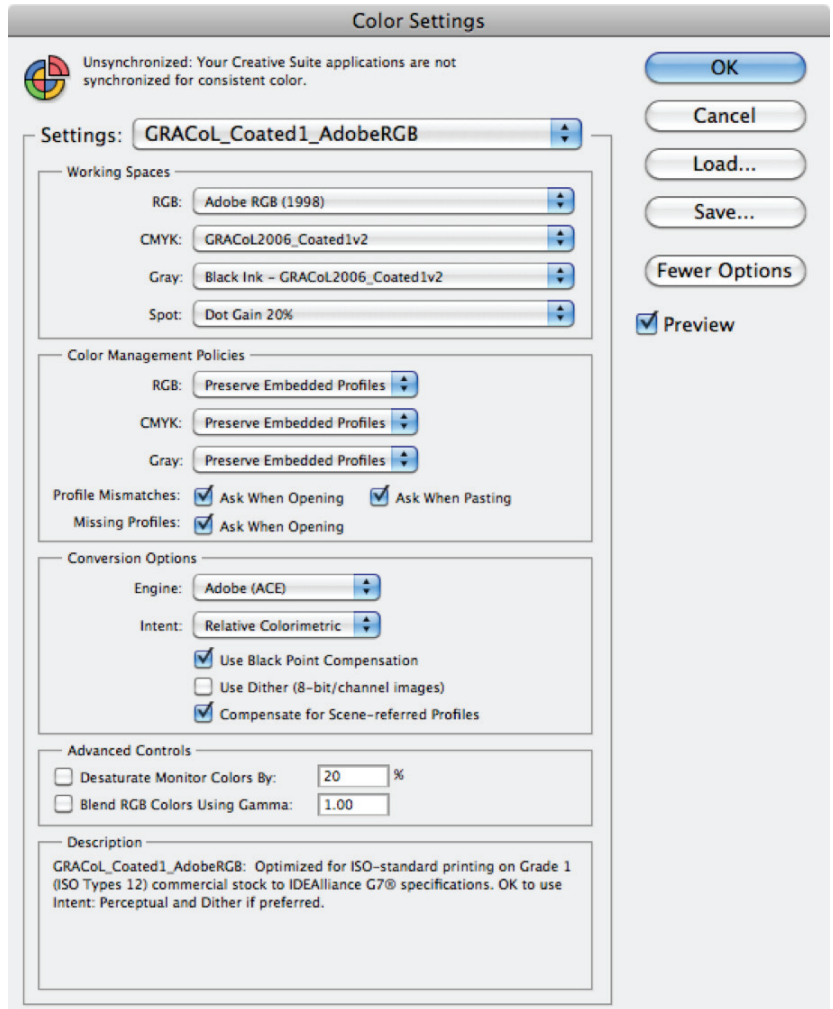
● **Paper color:** GRACoL datasets are based on a specific paper color. If a paper is more than 3 ΔE76 from the GRACoL aim, the paper is considered out of tolerance. (In this case the GRACoL dataset can be recalculated using substrate correction, as defined in CGATS 21, based on the paper color.) The resulting aims and dataset are called GRACoL Relative. GRACoL Relative is possible because G7 automatically scales its aims based on the paper color and the maximum density. A GRACoL Relative dataset will have different aims based on the color shift caused by the paper color.

● **Solids:** GRACoL aims for solids are specified in LAB and are based on values from the GRACoL Reference Characterization Dataset. The aims are to control the color of the solid ink. The tolerances for these aims are also specified in ISO 12647-2:2004 for GRACoL 2006, and CGATS 21 for GRACoL 2013.

● **Overprints:** GRACoL aims for overprints are specified in LAB and are based on the respective GRACoL datasets for GRACoL 2006 or GRACoL 2013. These aims specify the color of the overprints. GRACoL requires that the overprints be within a tolerance of 6 ΔE76.

● **NPDC curve:** The Neutral Print Density Curve specifies the weight of the G7 curve. Patches such as the HC (Highlight Range, 25. 19, 19), HR (50, 40, 40) and SC (75, 66, 66) are measured to ensure that the neutral print density for both the CMY and K channels is correct.

● **Gray balance:** Gray balance for GRACoL specifies the color of the gray along the G7 curve. Patches such as the HC (Highlight Range, 25. 19, 19), HR (50, 40, 40) and SC (75, 66, 66) can be measured to ensure that the neutral print density for both the CMY and K channels is correct.



● **G7 metrics change based on the color of the paper.** The values for both the gray balance and NPDC are calculated based on the substrate and the maximum neutral density on that print combination.

GRACoL is based on colorimetric measurements rather than mechanical press attributes. Simply printing to G7 on a sheetfed press is not considered GRACoL. GRACoL is based on the above colorimetric values being met.

LOCATION OF PROFILES

ICC profiles for GRACoL can be found here, on the IDEAlliance website (http://www.gracol.org) as well as at http://www.color.org.

HOW TO CONFIGURE GRACOL AS YOUR WORKING SPACE

The G7 Color Settings for Adobe® Creative Suite® can be downloaded from www.gracol.org.

(Some printers may use other settings or custom color settings. Please check with your print provider.)

ADOBE COLOR SETTINGS FILES

IDEAlliance provides several pre-set Adobe® Color Settings Files (.csf) for use when viewing or preparing images for G7 printing. These .csf files will automatically set

Adobe Creative Suite® applications (Photoshop, InDesign, Illustrator and Acrobat) to the ideal settings for a G7 workflow. These directions can also be found online at Adobe Color Suite Settings on the GRACoL page.

DOWNLOADING AND SAVING

For the GRACoL profiles, go to www.gracol .org and download CSF files for either the GRACoL 2006 or GRACoL 2013 profiles.

After downloading the G7 .csf files, drag them into the Adobe Custom Color Settings folder as follows.

> GRACOL 2013 IS VERY SIMILAR TO GRACOL 2006, SO MOST USERS WILL BARELY SEE A DIFFERENCE. BECAUSE GRACOL 2013 IS BETTER ALIGNED WITH TODAY'S PREMIUM COMMERCIAL STOCKS, PRINTERS SHOULD FIND IT EASIER TO SIMULATE PROOFS BASED ON GRACOL 2013 THAN ON GRACOL 2006.

DEFAULT MAC OSX LOCATION:

Users/ [Username]/ Library/ Application Support/ Adobe/ Color/ Settings.

DEFAULT WINDOWS LOCATION:

Documents and Settings/ [Username]/ Application Data/ Adobe/ Color/ Settings.

(This might vary based on operating system version. If you cannot find it, you can use your workstation's existing custom location.) Click the Load button in Photoshop's Edit – Color Settings... window, note the path to the custom folder, and then click Cancel.

CUSTOM LOCATION

On some workstations, custom .csf files might be in a custom location. If so, you can either move all of your custom .csf files back to the default locations shown above, or you can save the G7 .csf files in the existing custom location.

To find your workstation's existing custom location, click the Load button in Photoshop's Edit –Color Settings... window, note the path to the custom folder, and then click Cancel.

SELECTION IN CREATIVE SUITE: GRACOL 2006

Once the files are placed in the correct location, select the appropriate color settings file in your Creative Suite application(s) as follows.

Photoshop, InDesign or Illustrator

- Go to **Edit – Color Settings**...
- In the dropdown menu, select the appropriate color settings file according to the type of printing by which your work is most often printed.
- If your work is mostly for commercial printing on high-quality Grade 1 or 2 paper, select: GRACoL_Coated1_AdobeRGB.
- If your work is mostly for publication (magazine) printing on good quality Grade 3 paper, select: SWOP_Coated3_AdobeRGB.
- If your work is mostly for publication (magazine) printing on lower-quality Grade 5 paper, select: SWOP_Coated5_AdobeRGB.
- If your work often varies between publication and commercial printing, either change the color settings for each job or keep the settings you most frequently use but change the CMYK output profile as needed when converting images into CMYK.

SELECTION IN CREATIVE SUITE: GRACOL 2013

Once the files are placed in the correct location, select the appropriate color settings file in your Creative Suite application(s) as follows.

- Go to **Edit – Color Settings**...

- In the dropdown menu, select the appropriate color settings file according to the type of printing by which your work is most often printed.

- If your work is mostly for commercial printing on high-quality Grade 1 or 2 paper, select: GRACoL_Coated1_AdobeRGB.

- If your work is mostly for publication (magazine) printing on good quality Grade 3 paper, select: SWOP_Coated3_AdobeRGB.

- If your work often varies between publication and commercial printing, either change the color settings for each job or keep the settings you most frequently use but change the CMYK output profile as needed when converting images into CMYK.

SYNCHRONIZING VIA BRIDGE

If you have installed the whole Creative Suite, you can use Bridge to quickly "synchronize" all Adobe applications to use the same color settings, as follows:

- Launch Bridge from the File menu of any Creative Suite application.

- Go to **Edit – Creative Suite Color Settings**...

- Select whichever G7 Color Settings file is appropriate (see above).

USING G7 COLOR SETTINGS

Selecting the most appropriate .csf file for your type of work will automatically ensure that:

- A CMYK file displayed on your monitor looks as close as possible to a proof or final printed piece produced to the same specification.

- An RGB image displayed as CMYK looks as close as possible to a proof or final printed piece produced to the same specification.

(Note: Accurate color display requires an accurate custom monitor profile. Even then a profiled display will only simulate an actual proof or print under carefully controlled lighting conditions.)

> THERE IS VERY LITTLE DIFFERENCE BETWEEN SWOP 2006 AND SWOP 2013 FOR PAPER TYPE 3. THE PAPER WHITE POINTS ARE IDENTICAL AND THE SOLID AND OVERPRINT VALUES ARE VERY CLOSE.

- When you convert an image from any color space (RGB, CMYK, LAB, gray scale, etc.) into CMYK, the resulting file will be optimized for the specified type of G7 printing in terms of GCR, TAC, gamut mapping, etc.

- When you convert an image into grayscale mode, the resulting file will be optimized for printing with the black ink alone of the specified printing specification in terms of tonality (darkness/lightness and contrast).

CHANGING THE RGB WORKING SPACE

If your preferred RGB working space is not Adobe RGB (1998), you can change the RGB working space and save a modified Color Settings File as follows:

- Select the G7 Color Settings file in the **Edit – Color Settings**... window.

- Enable the More Options button.

- In Working Spaces – RGB, select your preferred RGB space.

- Click Save...

- Save your custom Color Settings with a new name, such as "SWOP_Coated3_[RGB Space]".

- Distribute this new Color Settings File among all of your peers who use the same RGB space.

SWOP 2013 INTRODUCTION

SWOP: The Preferred Reference for Publication Printing

For more than 30 years SWOP has been the default standard for publication printing. SWOP was started in late 1974 by a group of concerned industry experts who formed a committee to write specifications for material supplied to web offset publications. This is where the initial set of specifications that would become specifications for web offset publications (and its acronym, SWOP) were first envisioned. Many versions of SWOP were published over the years . Since 2006, the SWOP 2006 profiles have been the standard reference print condition for publication printing and proofing in North America and other world regions.

To keep up with industry trends, IDEAlliance has introduced an updated version, called SWOP 2013, which is nearly identical to SWOP 2006. The few minor changes are barely visible in most subject matter and should not significantly affect printers, designers or print buyers.

Differences Between SWOP 2006 and SWOP 2013 Paper Type 3

There is very little difference between SWOP 2006 and SWOP 2013 for paper type 3. The paper white points are identical and the solid and overprint values are very close.

Because the two datasets for paper type 3 are nearly identical, most print buyers and designers should see little visible difference. In fact, the differences are smaller than the typical variation between two good offset press runs. To see for yourself how small the difference is, open a CMYK image in Photoshop and assign a SWOP2006-based profile (e.g. SWOP2006_Coated3.v2), then toggle back and forth between a profile based on SWOP 2013.

Comparison of SWOP 2006 (left) and 2013 (right).

	Paper			C			M			Y			K		
	L*	a*	b*	L*	a*	b*	L*	a*	b*	L*	a*	b*	L*	a*	b*
2006	93	0	0	57	-37	-45	48	72	-3	88	-5	88	18	0	0
2013	92	**0**	**0**	**57**	-36	-44	48	**71**	**-4**	87	**-4**	88	**19**	0	1

	Red			Green			Blue		
	L*	a*	b*	L*	a*	b*	L*	a*	b*
2006	47	66	45	52	-65	25	26	18	-44
2013	48	65	45	51	**-62**	**26**	**27**	**20**	-44

SWOP 2006 vs. 2013 Colorimetric Values (changes in red).

Differences Between SWOP 2006 Paper Type 5 and SWOP 2013

One difference between SWOP 2006 and SWOP 2013 is that there is no longer a separate characterization dataset for SWOP 2013 paper type 5. The only characterization data supplied is for SWOP 2013 paper type 3. SWOP 2013 paper type 3 is part of a series of seven common appearance data sets, provided in CGATS.21 (see below), which range from wide gamut printing and offset coated (GRACoL) all the way down to newsprint. CGATS.21 provides a method of calculating characterization data for additional paper types. For legacy users of SWOP 2006 paper type 5, IDEAlliance has provided a legacy profile (SWOP2013C5.icc) calculated using this method, which is available on the IDEAlliance website.

Alignment with Standards

In 2013, both international (ISO) and U.S. (CGATS) printing standards were updated in response to industry trends. CGATS.21 is a new ANSI (American National Standards Institute) standard, approved in 2013, that contains seven reference print conditions (RPCs) representing seven different printing processes. Because all seven are based on G7 and common ink hues, maximum "shared appearance" is achieved when a common CMYK file is printed on all seven.

In CGATS 21, SWOP 2013 is known as CGATS 21-2, RPC5, where the old 2006 SWOP 3 and SWOP 5 conditions are represented by a single CRPC, reflecting the trend to use substrate correction for papers that are similar in general characteristics but have a moderately different white point.

CGATS 21-CRPC5 and ISO-12647-2. CGATS.21-CRPC5, on which SWOP 2013 is based, aligns closely with the updated version of ISO12647-2, Print Condition 2, which specifies traditional aim values for solid colorimetry and TVI (tone value increase) for improved lightweight coated publication printing.

All measurements used in SWOP 2013 are specified in M1. This means that SWOP 2013 calibration and assessment is to be done with M1 instruments.

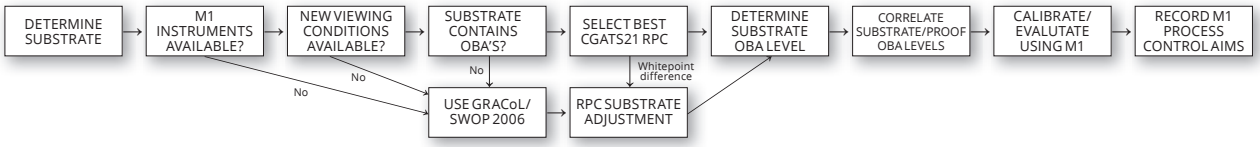
What This Means for SWOP Users

SWOP 2013 is very similar to SWOP 2006, so most users will not see much difference.

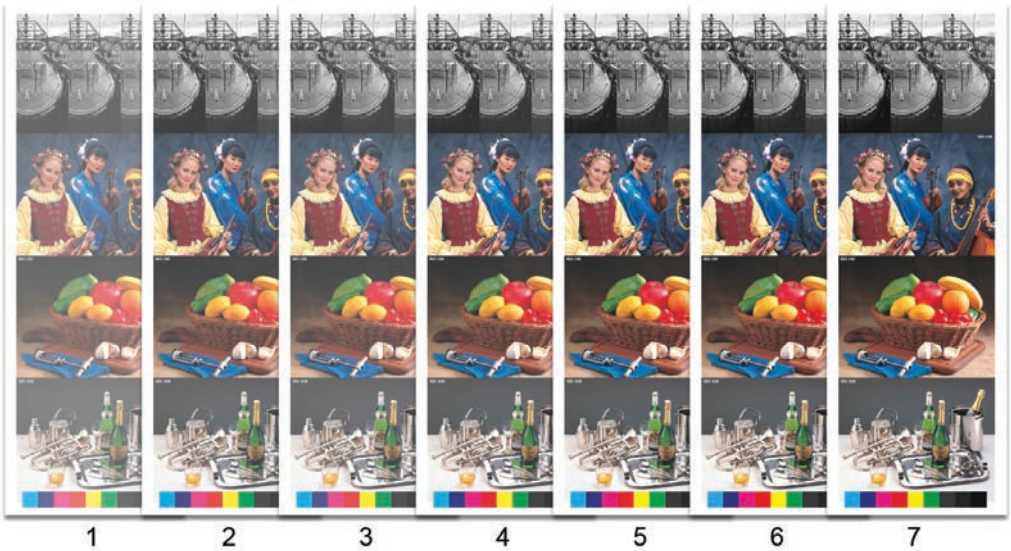
Calibration and verification of SWOP 2013 requires the use of M1-capable instruments. This means that SWOP 2013 cannot be used in production where substrates contain OBAs unless you have M1-capable instruments.

IDEAlliance recommends the following transition:

- If you only have M0 measurement devices, keep using SWOP 2006.



The above chart shows a simplified view of the M1 workflow used for substrates containing optical brighteners.



The above illustration shows a visual representation of all seven CGATS 21 datasets. All were calibrated on G7 and represent different gamuts based on varied stocks and printing processes.

- If you have M1 instruments, you may choose to move to SWOP 2013. In the SWOP 2013 workflow, M1 instruments are to be used for calibration and verification. (M0 instruments can still be used for process control.)

IDEAlliance expects that printers and premedia providers will migrate to new GRACoL 2013-based profiles over a period of several years, during which they will continue to use the legacy 2006 profiles as needed.

Obtaining New Profiles

Profiles for SWOP 2013 (and the other CGATS21-2 reference print conditions) can be downloaded from either the IDEAlliance website or the ICC profile registry at www.color.org.

IDEAlliance 2013 COMMON DATASETS

While GRACoL and SWOP are the best-known G7-based reference print conditions, these two datasets do not represent the full range of printing color spaces used throughout the industry.

IDEAlliance has been working on a family of G7 characterization datasets that represent G7 printing across a range of common substrates and print conditions. As a result of these efforts, a new standard was introduced in 2013. CGATS 21 provides a set of G7-based reference printing characterizations that represent the seven most common printing conditions. The new standards also provide a method of adjusting these datasets to accommodate actual paper colors encountered in real-world production. Because all seven reference print conditions are based on G7 and use common ink hues, maximum "shared appearance" is achieved when a common CMYK file is printed on all seven reference print conditions.

Alignment with Standards

At the time of publication, FDIS ISO 15339 was still in development. FDIS ISO 15339 is similar to CGATS 21 and is based on near-neutral calibration and common hue angles. By using CGATS 21, users can be assured of compliance with standards. The image above illustrates compatibility with current and legacy print conditions when using CGATS 21. All measurements used in these new datasets are specified in M1. This means that calibration and assessment of these new datasets is to be done with M1 instruments.

What This Means for Users

Users who typically print on non-GRACoL or SWOP applications may find this to be a more accurate G7 reference print condition for use in their workflow. The new standards also provide a method for adjusting these datasets based on substrate color. These new standards are designed to help designers and printers better match and produce color to G7 reference print conditions.

- CRPC1: gamut size and substrate of Coldset News.

- CRPC2: gamut size and substrate of commercial newsprint, flexo on porous substrate.

- CRPC3: gamut size and substrate uncoated offset– substrates with OBA.

- CRPC4: gamut size of substrate SCA, offset, gravure and uncoated corrugated.

- CRPC5: gamut size of and substrate of SWOP, publication gravure and wide web flexo.

- CRPC6: gamut size and substrate of GRACoL, narrow web flexo, commercial gravure, typical screen and digital.

- CRPC7: gamut size of premium processes, offset, flexo, digital.

To align your printing process, comparing gamut sizes will point to the correct dataset. Caution should also be taken to align substrate color and properties.

Calibration and verification of the 2013 CGATS-21 reference print conditions requires the use of M1-capable instruments. This means that GRACoL 2013 and SWOP 2013 should be used in production with substrates containing OBAs unless you have M1-capable instruments.