

Frequently Asked Questions (FAQs) Pertaining to G7, GRACoL and ISO 12647-2

What is G7?

Developed by IDEAlliance, and the GRACoL[®] committee, G7[®] is a calibration and process control methodology used to align proofing and printing systems to a “near neutral” definition of gray balance. G7 is the familiar acronym for this near neutral gray balance calibration process which also specifies colorimetric alignment with 7 ISO defined color targets. The “G” refers to calibrating gray values, while the “7” denotes the seven specified color values: cyan, magenta, yellow, black, red (M+Y), green (C+Y), and blue (C+M) that are monitored during calibration. The purpose of G7 calibration is to provide consistent gray scale reproduction across multiple devices, processes, and with a variety of print media. G7 relies on the G7 neutral print density curve, gray balance definitions, and calibration methodologies that are basically the same for any imaging technology which can be controlled by alterable prepress RIP or CtP curves (regardless of the substrate, inks/toners, screening technologies, etc.). With the practical goal of G7 calibration being “shared appearance,” the exchange of digital image files between different imaging processes becomes easier and the end result is a more predictable color match. G7 provides the basis for calibrating to GRACoL for sheetfed and to SWOP[®] for web.

Is G7 a printing standard?

No, there is one universal standard for offset lithographic printing: ISO 12647-2:2013. G7 complies with and supports the intent of ISO 12647-2:2013. ISO 10128:2009 includes methods that can be used to achieve G7 gray balance calibration.

Is G7 the same as GRACoL?

No. GRACoL is a reference data set/printing specification. G7 is a process calibration and control methodology that can be used to calibrate proofing and printing systems to various print specifications (GRACoL, SWOP, custom, etc.). See the explanation of GRACoL 2013[®] below.

What are the differences between a standard, a specification, and a methodology?

- A standard is established by a recognized authoritative body such as the International Organization for Standardization (ISO). The International Printing Standard ISO 12647-2:2013 is a broadly recognized set of measurement aim points and tolerances that define “good printing.”
- A specification is not a standard but rather a body of data (aim points, tolerances, and guidelines) for achieving the intent of a standard. GRACoL and SWOP, both owned by IDEAlliance, are specifications for sheetfed and web offset printing respectively. Several other organizations including FOGRA (Germany), IFRA (International), JIS (Japan), have produced specifications based on interpretations of ISO 12647-2.
- A methodology is simply a way of doing things. The G7 methodology defines grayscale appearance along with a calibration protocol for adjusting any CMYK imaging device to simulate G7 gray balance. G7 is also considered a specification.

What is ISO 12647-2:2013?

ISO 12647-2:2013 is the internationally recognized standard for offset lithographic printing processes. ISO 12647-2 specifies a number of process parameters (aim-points and tolerances) to be applied when preparing color separations for four color offset printing or when producing color prints by means of four-color offset lithographic processes. To date, ISO 12647-2 is the only official international printing standard. The intent of the International Standard is interpreted, applied, and implemented around the world by detailed printing specification data sets and various printing system calibration methodologies. The actual title of the ISO 12647-2 Standard is *Graphic technology—Process control for the production of half-tone colour separations, proof and production prints—Part 2: Offset lithographic processes*. The latest version of the Standard is ISO 12647-2:2013.

What is GRACoL 2013?

GRACoL, an acronym for the *General Requirements for Applications in Commercial Offset Lithography*, is generally referred to as a color reproduction specification for sheetfed offset lithography. GRACoL, in the generic sense, refers to the IDEAlliance Committee that began in 1996 as a graphics arts task force, formed to develop a document containing general guidelines and industry average data set recommendations that could be used as an industry wide reference for quality color printing. GRACoL 2013 is the 8th (and current) version of the GRACoL publication. GRACoL 2013 supersedes GRACoL 2006 (aka GRACoL 7) which has been the *defacto* reference data set for quite some time and is still widely used in the industry. GRACoL 2013 specifies a definition for gray balance and recommends characterization data for commercial offset

(sheetfed) printing. GRACoL provides aim points for proofing and for the printing system, and, GRACoL establishes a theoretical color space. The GRACoL 2013 specification also incorporates requirements for ISO defined ink and paper. GRACoL 2013 fully supports the International Standard: ISO 12647-2:2013. GRACoL 2013 specifies the white point for paper as 95L*, 1a*, -4b* (specified according to the M1 measurement condition) which is in alignment with ISO 12647-2:2013.

What is SWOP?

SWOP stands for *Specifications for Web Offset Publications*. Similar to the intent of GRACoL, SWOP is a color reproduction specification for web offset lithography. Developed by the IDEAlliance committee, the SWOP specification incorporates ISO defined inks and paper, and recommends characterization data for commercial offset (web) printing. SWOP provides aim points for proofing and for the printing system, and, SWOP establishes a theoretical color space. Until recently, there were actually two SWOP characterization data sets, SWOP 2006 Coated 3 for printing on a #3 stock and SWOP 2006 Coated 5 for printing on a #5 stock. SWOP was recently updated in response to updates of both ISO 12647-2 and the ANSI printing standard CGATS.21. The only characterization data included in SWOP 2013 is for paper type 3. It is important to note that all measurement data specified in SWOP 2013 were obtained with the M1 color measurement condition. For those who do not have the capability to measure in M1, SWOP 2006 can still be used.

What is the relationship between the ISO 12647-2 International Printing Standard and G7?

The ISO 12647-2 International Printing Standard defines the ingredients of “good printing” but it does not address the visual appearance of the final product. The G7 methodology is not claimed as a rival to the ISO Standard, but when used in conjunction with the GRACoL 2013 or the SWOP specifications (SWOP 2006 and SWOP 2013), G7 is a method of achieving the intent of the ISO standard. G7 accomplishes this by using characterization data sets to calibrate proofing and printing systems to neutral gray balance. Therefore, regardless of factors such as substrate, system gamut, and other print characteristics, all products printed by G7 Master print facilities should exhibit the same gray balance and neutral tonality—therefore creating reasonable visual matches from printer to printer.

Is there a G7 certified paper?

There is no such thing as a G7 certified paper. The G7 process is considered substrate relative as it allows neutral gray to appear “neutral” regardless of the substrate. When calibrating a printing system, gray balance targets are calculated according to the a* and b* values of the paper being used. This colorimetric calculation allows gray values to adapt to the optical characteristics of the printing paper—appearing neutral and balanced.

It is important to note that while the G7 system calibration methodology is not paper specific, there is, however, a GRACoL 2013 recommendation for paper

characteristics (e.g., white-point/shade) for printing system calibration. The GRACoL 2013 specification for paper, taken directly from ISO 12647-2:2013, is as follows: $L^* = 95$, $a^* = 1$, $b^* = -4$ (specified according to the M1 color measurement condition—see ISO 13655:2009). If the paper white-point is more than 3 ΔE_{76} from the GRACoL aim, it is considered out of tolerance. In this case the GRACoL data set can be recalculated using substrate correction (i.e., SCCA—Substrate Corrected Colorimetric Aims). The resulting aims and dataset are defined as GRACoL Relative.

Do the characteristics of paper affect G7 gray balance?

The G7 gray balance formula is substrate relative—meaning that G7 creates *paper relative gray balance* by adapting to the color of the substrate rather than being defined in absolute terms. This means that G7 grays will measure differently on different colored papers but will still appear neutral to the eye. G7 curves also compensate for other attributes of paper (e.g., gloss, ink holdout, etc.) and their effects on gray balance.

Does G7 calibration require a specific ink formulation?

G7 does not specify a standard ink or toner. The G7 calibration methodology is equally relevant to any ink or colorant (e.g., toner). The choice of ink depends on which print specification that you want to calibrate to (e.g., GRACoL, SWOP, FOGRA, a custom specification, etc.). GRACoL, SWOP, and FOGRA all specify that ink as defined by the ISO Standard ink be used in the printing system (*cf.* ISO 2846-1).

Is there a printing system that cannot be calibrated with G7?

If a color rendering or RIP device does not have user-editable output curves, the system cannot be calibrated using the G7 methodology.

What is G7 Process Control?

Variability is inherent in the printing process due to the myriad of ever-changing, often unpredictable system components. G7 process control emphasizes monitoring key metrics through the manufacturing process—from prepress through the pressroom. Scanning hardware and software systems can free the operators from much of the manual labor involved. If key print variables are noticed to be trending toward an out of spec condition, corrective action can be taken in order to correct the condition before printing output is seriously affected. IDEAlliance sponsors the G7 PC Program which gives the printer training and tools to best manage the print process.

What is a G7 Expert?

A G7 Expert has attended the G7 Expert Training course and passed a proficiency exam. Certification is valid for two years. In order to maintain certification, the G7 Expert must attend recertification training and pass a proficiency exam as well as remain employed by an IDEAlliance member

company. A G7 Expert is trained to analyze color and print related issues, and take corrective action to bring systems and processes in control to a set method, standard, or specification. A G7 Master candidate must work with a G7 Expert in order to receive qualification.

What is a G7 Professional?

A G7 Professional is typically an in-house quality/technical professional. The G7 Professional must attend the IDEAlliance training course and pass a proficiency exam. Certification is valid for two years. In order to maintain certification, the G7 Professional must attend recertification training and pass an exam as well as remain employed by an IDEAlliance member or G7 Network company.

What is a G7 Master printer?

G7 Master *qualification* is status granted to a facility, equipment, and systems. G7 Master printers are those that have been trained to use the G7 Proof-to-Print Process and can produce proofs or four-color prints according to G7 specifications. A G7 Expert must work with the candidate to educate the staff about G7 and then oversee calibration of proofing and/or printing systems. The G7 Expert must review and approve the calibration data prior to printed samples being submitted to IDEAlliance. Regardless of factors such as substrate, gamut and other print characteristics, all products printed at a G7 Master printer facility should exhibit the same gray balance and neutral tonality as defined by G7. Important point: a G7 Master receives qualification not certification from IDEAlliance.

Does Sappi recommend a certain paper for G7 calibration?

The G7 system calibration methodology works equally well with all papers. We would recommend that a printer calibrate their printing system using the paper that they run most often. If the goal of the printer is to calibrate their printing system to GRACoL 2006, GRACoL 2013, or SWOP 2013 specifications, Sappi North America will be glad to recommend suitable products.