



## Introducing the XCMYK Color Space

XCMYK is a new expanded-gamut color space based on high-quality sheet-fed offset printing using standard ISO 12647-2 compliant CMYK inks run to higher than normal levels, with non-traditional screening. The XCMYK color space can be reasonably approximated on any suitably-adjusted offset press without a custom ICC profile<sup>1</sup>, and can be simulated on other printing systems with equal or greater native color gamut, by ICC methods.

XCMYK is part of Idealliance's Expanded Gamut Project. The XCMYK research was conducted by the GRACoL Committee over a 15-month period in 2015-2016, and involved 26 test runs.

### How to Use the Supplied Profile and Datasets

The XCMYK profile and datasets provided here can be installed directly in most Digital Front Ends (DFEs) or RIPs, as well as ICC-aware software like Adobe Photoshop, Illustrator, InDesign, and other publishing applications. Note that the profile is ICC version 4, and may not work in older RIPs. You can create a version 2 ICC profile from the XCMYK dataset.

The XCMYK datasets come in both TC1617 and IT8.7/4 formats. TC1617 is a new Idealliance characterization target which contains all the unique patch values of the IT8.7/4, as well as the full gray and black ramps from columns 5 and 6 of the P2P51 target, in the same number of patches as the original IT8.7/4. The TC1617 results in better profile accuracy and reduces the effort needed to test for G7 Colorspace compliance.

### How the XCMYK Dataset and Profile Were Made

The XCMYK characterization data set was produced by analyzing selected press sheets taken from 26 experimental press runs performed in 2015 and 2016 at volunteer printing sites around the world, including Hong Kong, China, Singapore, Malaysia, Pakistan, Canada, and the US.

- Individual IT8 data sets were white point adjusted, G7-optimized and averaged.
- The averaged dataset was smoothed to remove noise and TVI artifacts.
- The averaged and smoothed dataset was formatted to the TC1617 patch set, iSis-Vertical layout, and the IT8.7/4 format.
- The final datasets were inspected and verified to have desired TVI and G7 target metrics.
- The XCMYK\_2017 profile was created from the TC1617 dataset using 300 TAC, black start 15, heavy black generation, maximum GCR.

### Printing and Proofing to XCMYK

The following pages give a brief outline of how to set up a press or proofing system to XCMYK specifications. For more assistance, look for a G7 Expert qualified in XCMYK.

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<sup>1</sup> As with GRACoL printing, a custom press profile may be needed for maximum accuracy.

## Introducing the XCMYK Profile

### Proofing to XCMYK

Any good ink-jet proofing system should be capable of simulating the XCMYK 2017 color space, simply by replacing the current “simulation profile” (e.g. GRACoL) with the XCMYK 2017 profile. Before setting up an XCMYK proofing system, make sure the basic printing device (without profiles applied) has a color gamut equal to or greater than XCMYK.

### Checking the Proofer Color Space

Note that the color gamut of some ink jet proofing systems may have been artificially constrained during the “ink limiting” or “ink restriction” stage. This can be determined as follows:

- In software like CHROMiX ColorThink Pro, load the proofer’s output profile and the XCMYK 2017 profile.
- Rotate the two profiles in 3D, checking to see that the XCMYK 2017 profile remains inside the volume of the proofer profile.
- If the volume of the XCMYK 2017 profile extends outside the proofer profile, the proofer has insufficient gamut for a perfect match.

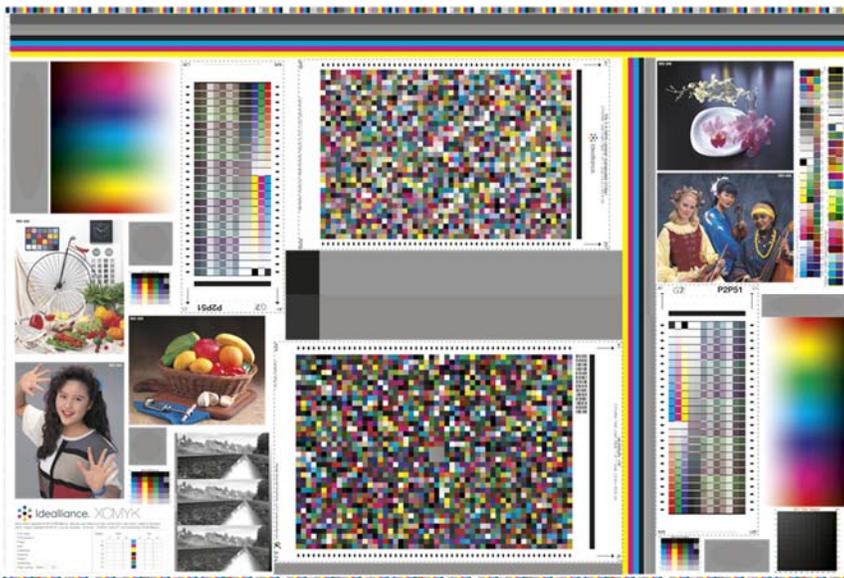
### Expanding the Proofer Color Space

It may be possible to expand the proofer’s native gamut by repeating the “ink limiting” or “ink restriction” procedures, then building a new proofer profile. If you don’t know how to do this, consult your proofing system manufacturer or color management specialist.

### Printing XCMYK on an Offset Press

Before working with XCMYK, an offset press must be calibrated to G7 using the consumables and settings suggested below. If you have never calibrated a press to G7, hire a G7 Expert.

A custom XCMYK test form (see below) is free to Idealliance members at [www.Idealliance.org](http://www.Idealliance.org).



*Idealliance XCMYK test form free to members at [www.idealliance.org](http://www.idealliance.org)*

# Introducing the XCMYK Profile

## Paper

Best results require a high-quality grade 1 coated commercial stock (80-100+ lb.). The white point in the XCMYK data is based on ISO 12647-2:2013, namely,

$$L^* 95, a^* 1, b^* -4 \text{ (all } +/- 1)$$

For custom applications, the XCMYK process can theoretically be applied to any substrate color or brightness, but the final color space will be significantly affected by substrate brightness, hardness, and absorption characteristics. More absorbent substrates will typically produce less gamut improvement.

## Screening

XCMYK printing works best with FM screening (typically 20 micron) or any other non-traditional screening that uses very small ink-receptive sites, such as ESKO's concentric dot screening. AM screening will tend to produce a smaller gamut improvement in light pastel, tinted colors.

## Inks

XCMYK is compatible with any good ink set currently used for commercial (e.g. GRACoL) printing. High-Chroma inks may help improve gamut at lower ink film thicknesses, but are not mandatory.

## Initial Ink Settings (Approximate)

Aim to achieve solid ink Lab measurements as close as possible to the values listed below, which are taken from the XCMY 2017 data set. Don't worry if you can't achieve these numbers exactly. The individual press sheets from which they were averaged varied considerably from each other, yet still looked very similar to the eye.

W:	95 L*	1 a*	-4 b*
C:	49 L*	-32 a*	-61 b*
M:	46 L*	80 a*	5 b*
Y:	90 L*	-3 a*	105 b*
K:	8 L*	0 a*	0 b*
R:	46 L*	73 a*	56 b*
G:	42 L*	-72 a*	24 b*
B:	19 L*	19 a*	-51 b*

## Status-T Densities (Approximate)

The following densities may be used as rough guide to setting ink levels, but remember Lab values are more exact.

C:	1.85
M:	1.85
Y:	1.20

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K: 2.0

### 300% Neutrality

It is just as important that the 300% CMY overprint patch remains as neutral as possible (close to zero  $a^*$ ,  $b^*$ ) as it is to achieve the perfect CMY solid LAB values. If possible, adjust the yellow ink more than C or M to neutralize the 300% patch.

### G7 Calibration

Run enough sheets to reach press stability, then calculate G7 correction curves and create new plates.

### XCMYK Confirmation Run

Perform a G7 confirmation run with the new plates at the same ink levels determined in the first run. Run enough sheets to reach press stability.

### Validation and Optional Custom XCMYK Press Profile

If the appearance of the confirmation sheet does not closely match a proof made from the supplied XCMYK 2017 profile, either adjust the press for a better match, or build a custom XCMYK profile for your press from the characterization target on the confirmation sheets. This profile can be used to convert standard XCMYK files for your press, and/or to create a custom proof setup that more closely matches your press.

## About Idealliance

Idealliance is a graphic communications industry association representing a unique convergence of printers, mailers, marketers, agencies, publishers, and their media materials and technology providers. The association works to collaborate on its integrated capabilities to advance technical and management best practices; deliver best-in-class research, education, and certifications; and serve as a united industry advocate.

For more than 50 years, Idealliance has developed standards defining and redefining workflow and supply chain for color, content, mail, paper, production and applying fundamental XML technology. Core media specifications created by Idealliance include GRACoL®, G7®, Mail.dat®/XML™, papiNet®, PRISM®, PROSE/XML™, and SWOP®.