



G7[®] System Certification Application Data Sheet

Konica Minolta Color Care[™]



The IDEAlliance Print Properties Working Group has established a certification process for G7 Systems. In accordance with this process The G7 System Certification Program is designed to evaluate the ability of a candidate system to calibrate a printing device to meet the G7 grayscale definition using four 1-D Curves within the tolerances outlined in this document. All evaluations are based on the parameters of the G7 Specification (draft 2008). The following information is intended to assist producers and consumers in the use of the vendor system as specified for creating the four 1-D Curves.

Manufacturer

Konica Minolta Business Solutions, Inc.
100 Williams Drive
Ramsey, NJ 07446
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Product

Color Care[™] version 2.2.1 with CurveCore[™] Module

Testing Instructions (procedures)

A. Printing the test target(s)

Print at least one sample P2P target (version 25 or higher) on the device to be calibrated. For G7[®] calibration to be effective, it is recommended that the device to be calibrated is capable of printing uniform, successive prints with virtually identical characteristics across the whole image area be used. Prints used for calibration or

verification should be free from blemishes or other artifacts.

B. Measuring the target(s)

Measure the printed P2P target with a spectrophotometer such as Konica Minolta FD-5BT, Konica Minolta FD-7, X-Rite i1Pro, X-Rite i1Pro2, or X-Rite i1 iSis, in the Color Care™ Catch application. The template used in the Color Care™ Catch application is called '**Quality Control Pressroom**'. Select the appropriate instrument and click '**OK**'. Select the '**Filter**' and '**Light Source**' to be used and calibrate the instrument. Follow the scanning order of the on-screen display and measure the P2P target.

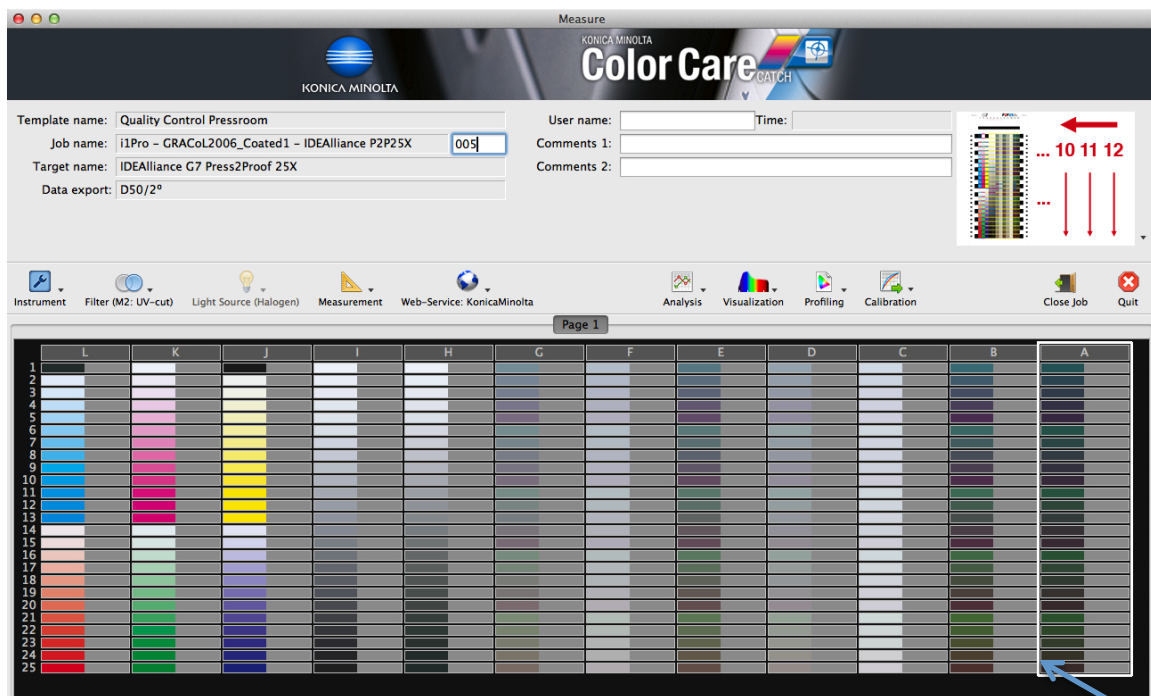


Figure 1

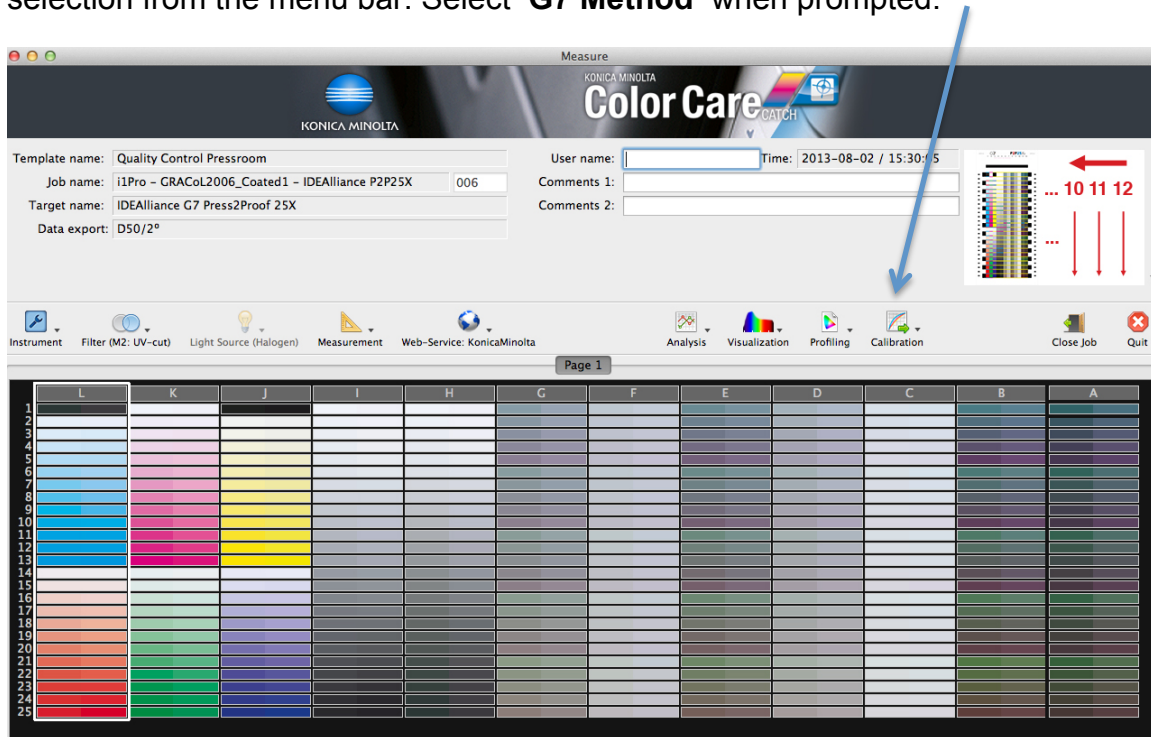
Please note: the scanning order in which Color Care™ Catch operates is right-to-left. Please pay close attention to the highlighted 'WHITE' rectangle that will guide the user as to what column and row to measure.

Multiple charts can be averaged together by selecting '**Load**' under the '**Measurement**' tab. Shift-click the measured files you would like to average and then select '**Average**'. This process actually creates a new file which can be used for creating the calibration files.

C. Calibration and G7® curve creation

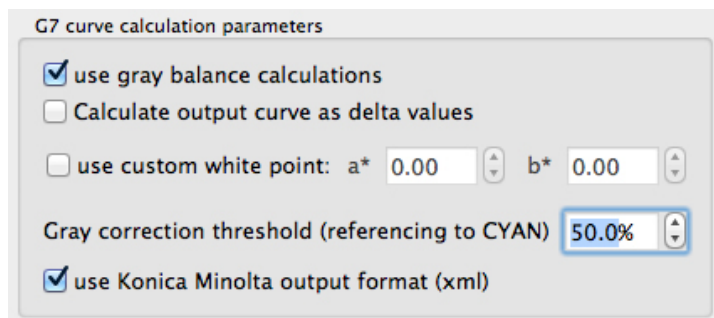
G7[®] curve creation within Color Care[™] requires the purchase and installation of an additional license file. (Please refer to Appendix A for licensing and installation instructions).

Load the measured file to be used for G7[®] calibration and click on the **‘Calibration’** selection from the menu bar. Select **‘G7 Method’** when prompted.



D. Adjusting G7[®] curve calculation parameters

Color Care[™] allows the user to define five parameters for G7[®] curve calculation.



Use gray balance calculations:

By default, Color Care[™] analyzes and attempts to correct gray balance errors on a 3-color gray scale. The ‘use gray balance calculations’ function works best on

devices whose gray balance is stable and repeatable. Gray balance correction may be less reliable on devices with a very strong gray bias, or where gray balance measurements are inconsistent due to mottling, uneven inking, unstable ink trapping, etc.

Switching ‘use gray balance calculations’ ON and OFF:

Gray balance calculations can be switched ON and OFF by selecting or de-selecting the appropriate check box. When the ‘use gray balance calculations’ button is checked, Color Care™ calculates separate control point values for C, M and Y. When gray balance is unchecked, Color Care™ calculates identical CMY control point values based on the NPDC curve aims.

Gray balance should only be switched off if the device already produces neutral gray balance without the need for separate curves, or if it is nearly neutral and can be neutralized next time you print by physical adjustments to the device itself.

Calculate output curve as delta values:

By default Color Care™ calculates absolute TV (Tone Value) percentages for the pre-defined control points. If your RIP requires delta TVI (Tone Value Increase) percentages instead, click the delta checkbox. The delta display is also useful when comparing the calibrated device to the ideal NPDC curves. Delta values less than 1% typically indicate a good calibration.

Use custom white point

When the ‘use custom white point’ feature is de-selected gray balance is based on the color of the substrate on which the P2P was printed. By clicking ‘use custom white point’ and entering paper a* and b* values manually, Curve Core™ will create calibration curves to simulate the effect of the new substrate everywhere except the very lightest tones.

Gray correction threshold (referencing to CYAN)

The ‘gray correction threshold’ defines the cyan percentage at which gray balance correction begins to reduce. With a setting of 50%, gray balance is fully corrected from 0% to 50%, but only half corrected at 75%, and no correction at all is applied at 100%.

The default setting (50%) is recommended for most printing devices where gray balance varies from run to run. Raising the threshold will extend gray balance correction further into shadow tones, but accuracy depends on device stability. Although a setting of 100% is allowed, the maximum effective threshold depends on the darkest gray slice on the P2P target, (currently 87.5%).

Use Konica Minolta output format (xml)

By selecting the ‘use Konica Minolta output format (xml)’, the user has the ability to produce an .xml file that can be uploaded directly to the IC601 and IC602 Konica Minolta controllers. Unchecking the ‘use Konica Minolta output format (.xml)’ will save

an ASCII formatted file that can be opened in any word or text application. Click the appropriate format and then 'Export G7 curve...' to save the file to a selected folder location.

E. Printing a “Verification” target

Print the P2P target again on the same printing system, using the same media and system settings used to print the original test target, but through the new RIP or tone curves calculated in the previous section.

Measuring the Verification target

Measure the verification P2P target in exactly the same way as the original test target. It is best to add additional information and comments to help define which data files are from the “Calibration” and “Verification” runs.



Figure 2 shows the software interface for setting up a calibration run. The 'Comments 1' field is highlighted with a blue arrow, indicating where to enter 'Calibration Run #1'.

Figure 2

Comments should be made here defining 'Calibration run' or 'Verification run'

F. Analyzing Results

Once the verified target has been read, select 'Calibration' > 'G7 Method' from the main selection bar. Verification results will appear in the bottom part of the screen display and will look something like this.

Verification results			
	CMY weighted delta-L*	CMY weighted delta-Ch	K weighted delta-L*
Average $\leq \Delta E$ 1.5	✓ (1.01)	✓ (0.96)	✓ (0.75)
Maximum $\leq \Delta E$ 3.0	✓ (1.8)	✓ (2.5)	✓ (2.53)

The tolerances have been preset to match the IDEAlliance tolerances and are not able to be modified. Green check marks ✓ means the measured delta values meet or are lower than the tolerances set forth. Red X marks ✗, means the measure values are higher than the tolerance permits. The values in parentheses are the actual values used.

“Color Care” Tolerances

Using the 2010 G7 System Certification sample test files and the IDEAlliance Validation Process (see below) “Color Care™” will achieve tolerances equal to or lower than the following.

Metric	Average	Maximum
ΔF^* (CMY only)	≤ 1.0	≤ 2
ΔL^* (CMY & K)	≤ 1.0	≤ 2

Table 1: “Color Care™” tolerances for 2010 sample test files

Note: Because the current G7 System Certification method uses a simulation process that eliminates print-to-print variation, and because the sample data provided by IDEAlliance for G7 System Certification is highly uniform, “Color Care” can produce extremely low delta errors with those specific data files. Higher errors should be expected when calibrating live printing devices, depending on the characteristics and variability of each printing system.

Validation

To validate that the G7® calibration process has been successful, a target consisting of two gray scales having the CMYK patch values listed in **Appendix B:** shall be printed through the calculated correction curves using the same print settings in use when the calibration was calculated.

Validating NPDC (CMY and K scales)

To validate NPDC correction, both the K-only scale and the CMY-only scale shall be measured with a densitometer or spectrophotometer and the relative neutral density (ND) values (measured in the “K” or “Visual” channel) shall be recorded for each patch. To obtain relative ND values, either the measuring device shall be zeroed on the substrate, or the white patch neutral density value shall be subtracted from itself and all other patches.

The (relative) ND values shall be converted to (relative) L^* by the standard CIE formula in **Appendix C:** The Delta L^* (ΔL^*) error shall be computed for each patch compared to target values on file with IDEAlliance® by the formula in **Appendix C:**

Validating Gray Balance (CMY scale only)

To validate gray balance correction, the CMY-only scale shall be measured with a spectrophotometer and the a^* and b^* values recorded for each patch. The Delta F^* (ΔF^*) error shall be computed for each patch compared to target values on file with IDEAlliance by the formula in **Appendix C**:

Color Care™ and CurveCore™ have simplified the validation process by including this feature into its graphical user interface. Green ✓ and Red ✗ will indicate if the validation run has passed or failed to the pre-defined tolerance set. Passing means that the G7® calibration process is complete. The tolerance settings for Color Care™ are based upon IDEAlliance® recommendations:

Tolerances set forth by IDEAlliance®

Metric	Average	Maximum
ΔF^* (CMY only)	≤ 1.5	≤ 3
ΔL^* (CMY & K)	≤ 1.5	≤ 3

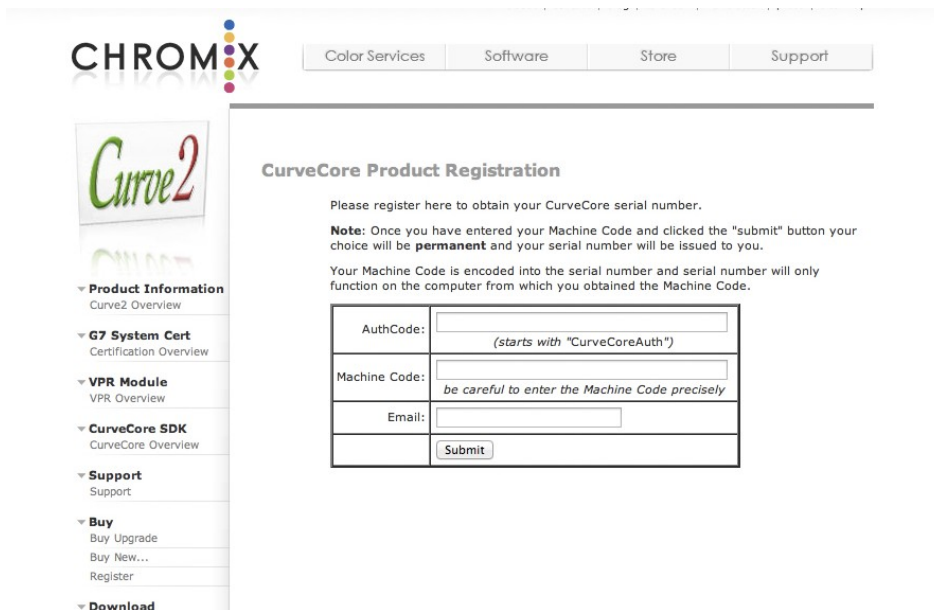
Appendix A:

Software Installation - CurveCore™

Thank you for purchasing CurveCore™, the latest Color Care™ accessory module. CurveCore™ helps you calibrate your output devices to meet the IDEAlliance G7® specification.

Step #1 - Obtaining the application license code

A registration license will be e-mailed to the end-user at the account. (The end-user is the customer's point of contact assigned to receive the license or the person performing the installation.) Typically the registration license begins with *CurveCoreAuth*. This license code, as well as the machine ID from Color Care™, will need to be entered at the website <http://www2.chromix.com/curvecore/register>. (The Color Care™ machine ID can be found by launching Color Care Catch™ and selecting "License..." under the "Help" selection). The website should look something like this:



CHROMIX Color Services Software Store Support

CurveCore Product Registration

Please register here to obtain your CurveCore serial number.

Note: Once you have entered your Machine Code and clicked the "submit" button your choice will be **permanent** and your serial number will be issued to you.

Your Machine Code is encoded into the serial number and serial number will only function on the computer from which you obtained the Machine Code.

AuthCode:	
	(starts with "CurveCoreAuth")
Machine Code:	
	be careful to enter the Machine Code precisely
Email:	
	Submit

Enter the registration license, machine ID # and a valid e-mail address, and then click Submit. A pop-up display will appear providing the user with an authorized application license. (This application license will also be e-mailed to the supplied e-mail address.) Copy this application license and proceed to step #2.

Step #2 Loading the application license code

The application license code obtained in Step #1 is installed within the Color Care Catch™ application.

Step A: Open Color Care Catch™

Step B: Select 'Quality Control Pressroom'

Step C: Select the measuring device of choice and select 'OK'

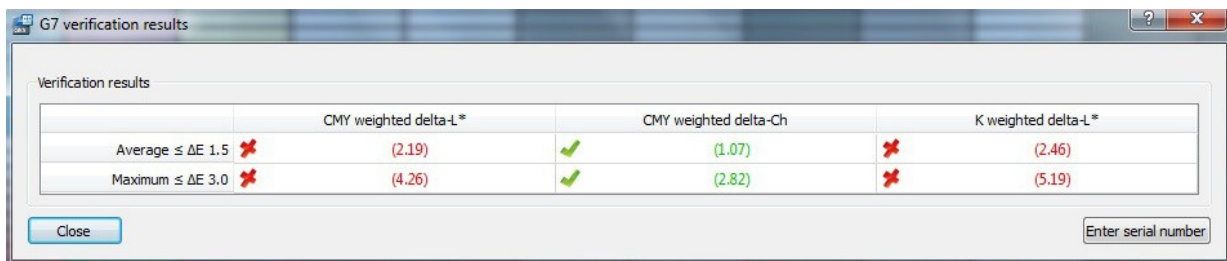
Step D: Measure a P2P25X target with the selected measuring device.

(You must measure or 'Load' a pre-measured P2P25X target first before the license can be loaded!)

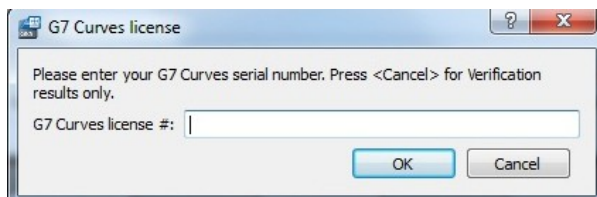
Step D: Once the measurement process is complete select the 'Calibration' feature

Step E: Select 'G7 Method'

Step F: Select 'Enter serial number'



Step G: Paste the application serial number (from step #1) in the appropriate window when prompted to do so

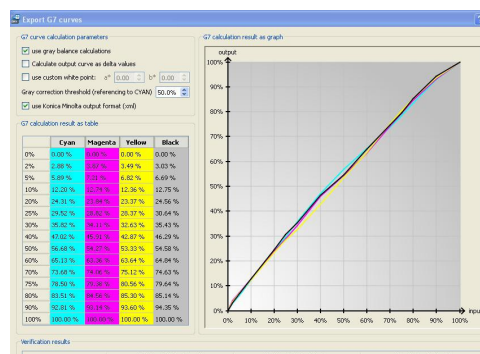


Please enter your G7 Curves serial number. Press <Cancel> for Verification results only.

G7 Curves license #:

OK Cancel

Once the CurveCore™ option is properly licensed you will see the complete version when selecting: 'Calibration' & 'G7 Method'. The licensed version will look something like this:



Appendix B:

P2P patch values

*CMYK percent values in
column 4 of the P2P target
(K Only)*

C%	M%	Y%	K%
0	0	0	0
0	0	0	1.96
0	0	0	3.92
0	0	0	5.88
0	0	0	7.84
0	0	0	10.2
0	0	0	14.9
0	0	0	20
0	0	0	25.1
0	0	0	30.2
0	0	0	34.9
0	0	0	40
0	0	0	45.1
0	0	0	49.8
0	0	0	54.9
0	0	0	60
0	0	0	65.1
0	0	0	69.8
0	0	0	74.9
0	0	0	80
0	0	0	85.1
0	0	0	89.8
0	0	0	94.9
0	0	0	98.04
0	0	0	100

*CMYK percent values in
column 5 of the P2P target
(CMY Only)*

C%	M%	Y%	K%
0	0	0	0
1.96	1.18	1.18	0
3.92	2.77	2.77	0
5.88	4.15	4.15	0
7.84	5.61	5.61	0
10.2	7.41	7.41	0
14.9	11	11	0
20	14.9	14.9	0
25.1	18.8	18.8	0
30.2	22.91	22.91	0
34.9	26.78	26.78	0
40	30.98	30.98	0
45.1	35.48	35.48	0
49.8	39.82	39.89	0
54.9	44.71	44.71	0
60	49.8	49.8	0
65.1	54.9	54.9	0
69.8	60.16	60.16	0
74.9	66.07	66.07	0
80	71.77	71.77	0
85.1	78.06	78.06	0
89.8	84.61	84.61	0
94.9	92.2	92.2	0
98.04	96.86	96.86	0
100	100	100	0

Appendix C:

Formula

Converting ND to L*

$$Y = 1/10^{\text{ND}}$$

If: $Y > (6/29)^3$

$$L^* = 116 \times Y^{1/3} -$$

16 Else:

$$L^* = 116 \times (841/108 \times Y + 4/29) - 16$$

Calculating Delta L* (ΔL^*)

$$\Delta L^* = (L^*_{\text{sample}} - L^*_{\text{target}})$$

Calculating Delta F* (ΔF^*) – also known as Delta-ab

$$\Delta F^* = ((a^*_{\text{sample}} - a^*_{\text{target}})^2 + (b^*_{\text{sample}} - b^*_{\text{target}})^2)^{1/2}$$