

1. Information on Test Charts

1.1 GMG Test Charts

The following test chart files (*.tif) and corresponding measuring templates (*.txt) can be downloaded from the GMG support website (<https://support.gmgcolor.com/>) and have been tested and approved for use with GMG OpenColor.

- Single ink strips for 1, 3, 4, 6, 8 inks
(small version with the following patches: 0/2/10/25/40/60/80/100, large version with the following patches: 0/2/6/10/20/30/40/50/60/70/80/90/100)
- ECI2002 / IT8.7.4 / TC4 test charts, FlexoChart V2
- TCN test charts with 6 / 7 inks for Flexo and Offset/Gravure

GMG test charts provide a good balance between size and precision and are optimized for the mathematical model used by GMG OpenColor.

1.2 Measuring with GMG Test Chart Templates

GMG test chart **templates** are reference text files describing the layout of the test charts (e.g. the number of patches, arrangement of the patches) and need to be loaded in the software you use for measuring the test charts. GMG test chart templates are configured for the measuring software **MeasureTool** and **i1Profiler** from X-Rite. The following two segments provide you with information on how to measure test charts with the supplied reference templates.

Measuring in MeasureTool

MeasureTool is a component of ProfileMaker 5 and will be phased out in favor of i1Profiler supporting the latest measuring devices such as the i1Pro 2. For measuring devices which have been on the market for a while, we recommend using MeasureTool as a measuring software.

- ➔ **Download** ProfileMaker 5 from the X-Rite website (www.xrite.com)
- ➔ Select the **MeasureTool** option when running the setup in order to use the tool in **demo mode** without any licensing
- ➔ Open test chart templates as **Reference Files** from a folder of your choice
- ➔ Save the measurement as spectral data (*.txt), using the **File** menu > **Save As** (and **not** the **Export Lab** button)

Note For more information on how to measure test charts in MeasureTool, please refer to the integrated **Help** of the software.

Measuring in i1Profiler

Temporary limitation: GMG test charts for the **i1iO** measuring device with two pages (e.g. the IT874 for i1iO_2pages) are arranged according to i1 defaults in the current version of i1Profiler and **cannot** be measured via the **Measure Reference Chart** dialog.

- ➔ **Download** i1Profiler from the X-Rite website (www.xrite.com)
- ➔ Activate the **User Mode** option **Advanced**
- ➔ On the left pane, click **Measure Reference Chart** and **load** the test chart template
- ➔ Save the measurement as **i1Profiler CGATS Profilemaker5 Spectral** text file

Note For more information on how to measure test charts in iProfiler, please refer to the integrated **Help** of the software (press the F1 key).

1.3 Custom Test Charts

You can **import** measurement data from custom test charts.

<i>Custom Chart</i>	<i>Extent of Use in OpenColor</i>
Solids, single ink strips	1 c (single ink) patches and 100% (full tone overprints) will be imported. Not supported patches will be ignored .
Test chart (full characterization)	Note: Select the Test Chart Type <other – single inks + full tone overprints> .

1.4 Can I Use Old Charts and Measurement Data?

Basically, yes. You can import already existing measurement data just as described in chapter "Test Chart Types—Which to Choose?" on page 2. Measurement data of the TC4 require a special procedure as described in the following.

How to import TC4 measurements

The TC4 test chart is not considered an ideal choice for characterizing a 4c printing process in GMG OpenColor and has thus **not** been integrated as a regular option in the measurement import. If you want to use a TC4 measurement, maybe because you have already printed and measured these charts for other purposes, you have the possibility to enable this import option by copying a configuration file to the program folder. Please contact GMG Support to provide you with the configuration file.

1. Please close GMG OpenColor before adding the configuration file to the database.
2. Uncompress the received ZIP archive to your local computer. It contains a folder named **{d409247f-0c84-42fb-a31c-0e7db5bfd376}** including a file named **_document**.
3. Copy this folder from the archive to the GMG OpenColor subfolder **MeasureChartDef**.
4. After restarting GMG OpenColor, the TC4 will be available in the **Test Chart Type** list of the import wizard.

1.5 Test Chart Types—Which to Choose?

The quality of the profile and the overprint simulation will be the better, the more measurement data you provide. Depending on your needs, measurement data of single inks and full tone overprints will be sufficient in some cases. In other cases, you might want a more precise simulation based on more patches.

To determine which test chart fits your needs, consider the following questions.

- How many inks do I have?
- Which printing process do I want to profile?
- Which are my quality requirements?

In the table below, you will find tips and recommendations when to use which test chart.

Inks	Recommended Test Chart Type	Info
Single inks	<other – single inks + full tone overprints will be used>	<p>You can calculate a profile without overprint information just based on a 100% patch for each printing ink, the paper tint of the media and a gradation curve. Gradation curves can be defined in the Profile Settings view. Full tone measurements are the minimal input requirement for calculating a profile.</p> <p>A comparatively better profile quality can be achieved with single ink strips. GMG provides you with single ink strips for up to 8 inks and in two versions (small / large). The large strip versions contain more fulcrums in the high-lights.</p>
Custom targets with or without overprint patches	<other – single inks + full tone overprints will be used>	<p>Custom charts (= non-GMG charts, e.g. ProfileMaker charts) are basically not supported, but GMG OpenColor is able to extract the single ink (1c) and full tone overprint information to calculate the profile. The same goes for old measuring data. If you already have prints and measurements of custom test charts, select this Test Chart Type to import the data.</p>
Up to 4 inks Off-set/Gravure	ECI2002 / IT8	<p>Standard 4c charts for profiling, there is practical no difference between the IT8.7/4 and the ECI2002. Measurements of these two test chart types contain 4c overprint information and add a lot of extra color information for calculating a profile in good quality (approx. 1500 color patches in random layout).</p>
Up to 4 inks Off-set/Gravure	TC4	<p>The TC4 test chart includes more color patches than the ECI2002 chart and should only be used for very colorful separations, having a high number of fulcrums in CMY and only few in the Black levels. As we consider this test chart as not being the ideal choice for characterizing 4c printing processes, you will not find the corresponding Test Chart Type as an import option in the software. You can, however, enable this type manually, by adding a configuration file to the program files (see "Can I Use Old Charts and Measurement Data?" on page 2).</p>
Up to 4 inks Flexo	FlexoChart V2	<p>Similar to ECI2002, but with more fulcrums in the highlights (0-25%) to ensure a homogeneous output and stability for standard flexo printing processes. Use this test chart for profiling flexo printing processes with up to 4 inks.</p>
More than 4 inks	TCN	<p>GMG TCN test charts have been developed for GMG OpenColor to reflect multicolor printing processes in the best possible way.</p> <p>Select the TCN version according to the printing process (e.g. Flexo) and the inks you want to reproduce. For example, if you want to profile a flexo hexachrome printing process, print and measure the <i>TCN-6c-CMYKOG-FLEXO-overprint4c</i> test chart (see "Multicolor TCN Test Charts" on page 4).</p> <p>If you use the Black channel for a light color, it is recommended to use the TCN version with a separate channel for the markers (e.g. the lines separating the patches). These versions can be easily identified looking at the test chart name. This way, you can assign a darker color to this extra channel so that the measuring device is able to recognize the patches (otherwise the contrast between the patches might be too weak).</p>

Tip For profiling a multicolor process, you can also **combine** measurements from different charts. Depending on your quality requirements, you can, for example, print and measure two ECI charts for an 8c process, or combine the measurements of an ECI or IT8 with single color strips.

1.6 Single Ink Strips

All GMG single ink strips are available in a small version with 7 patches per inks and in a large version with 12 fulcrums per ink (both include paper tint patches).

The corresponding templates include color information on the way the strip is shown in the measuring software (preview), the number of patches and the layout of the patches. You can open the template files in a simple text editor to see how they are structured.



Fig. 1 GMG single ink strip for three inks.

1.7 Multicolor TCN Test Charts

TCN test charts are designed for 6 / 7 inks, but contain patches with overprints of only up to 4 inks, indicated by the **overprint4c** suffix at the end of each TCN test chart name.

The overprint patches in a TCN test chart are based on the assumption that **complementary** colors such as Green and Magenta are usually not overprinting. Therefore, TCN test charts do not contain overprint patches for complementary colors. For example, there are no patches for 50% Green overprinting 50% Magenta. Only 100% overprint patches of inks with the same screen angle are included, overprinting with certain proportions of complementary inks, for example 100% Green and 20% Magenta, as full tones do not require any screening.

Which screen angle should be used for which ink?

In a standard CMYK printing process, the screen for each printing ink is set at a different angle in the imagesetter. Standard sets of screen angles are used.

When using non-standard printing inks, however, finding the right set to achieve a high print quality and to avoid Moiré effects is a bit more complicated. Which ink should use which screen angle? In addition to that, only combinations of four screen angles might be used. Therefore, two inks will use the same screen angle in a 6c printing process.

In general, it is recommended to use the same screen angle for a printing ink as is used for the **complementary** color, as complimentary colors normally do not overprint. For example, Red should use the same screen angle as is used for Cyan, and Green should use the same screen angle as is used for Magenta.

However, this rule of thumb does not always apply. Blue, for example, should **not** use the same screen angle as is used for its complementary color Yellow, as Yellow is a much lighter color. For the lightest color in the process, a screen angle is generally used that cannot be used for the darker colors, simply, because resulting Moiré effects normally do not show in the print. Using a standard screen angle set, the screen angle for Yellow and Cyan will have a small distance of only 15°. If a dark color such as Blue will use the screen angle normally used for Yellow, Moiré effects might be very much visible.

Recommended screen angles

The following table gives you an idea on which screening angle to define for which printing ink when using a TCN test chart.

<i>Ink</i>	<i>Recommended Screen Angle</i>
Orange / Red	Cyan

<i>Ink</i>	<i>Recommended Screen Angle</i>
Green	Magenta
Blue	Black

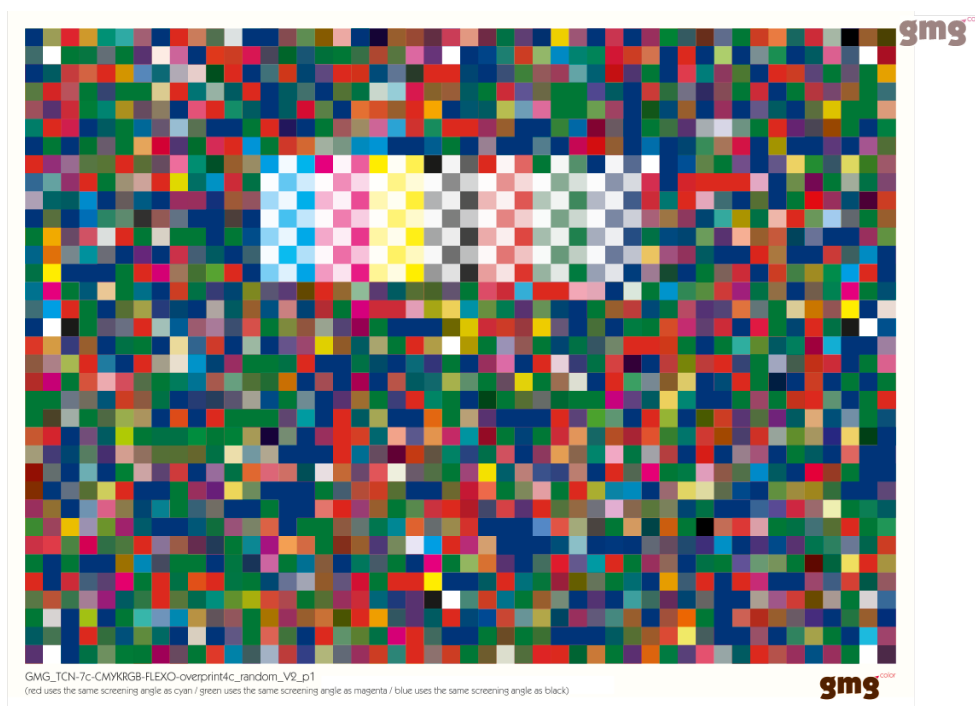


Fig. 2 GMG TCN chart for 7 inks.

1.8 Tips for Printing Test Charts

1.8.1 No color management for test charts

Test charts are usually untagged CMYK TIFF or PDF documents. Please make sure that your test chart documents do not undergo a color conversion (which can happen when processing the file in a RIP or opening it in a standard graphics software and converting it to a default working color space).

1.8.2 Record your printing settings

The settings you are using to pass the test chart data to the printer should be recorded, as the same settings should be used once the profile is calculated.

1.8.3 Check the print output for consistency

If you notice your printing machine is not consistent in printing across the entire media width with the same ink density, it is recommended to place multiple test charts on the media and rotate each in a way to make sure the resulting measurements will account for variations.

1.8.4 Only measure clean and dry test charts

Whatever process you are using, make sure the color stabilizes or dries prior to measuring. Some printing technologies use inks that will not fully dry down for at least 24 hours. The printed test chart should be handled with care. Smudges or finger marks on a single color patch can result in poor reading and affect the profile quality.