

Certified – but how?

We have repeatedly written about quality assurance in Spindrift, not least about print certification according to the ISO standard 12647. But what criteria are in this standard, what is it that's actually measured? In this article we will describe the core elements of the standard, so that ad agencies, publishers and other print buyers have a better idea of what they are getting when buying print from a certified printing company.

The ISO 12647 standard describes several types of print production. Perhaps the best known of these is 12647-2, which covers high quality offset print – both sheetfed offset and heatset web offset. Newsprint – web offset on lower grade paper has its own category, the 12647-3 standard. Gravure, flexo and screen have their own sections, but digital printing still lacks an ISO standard of its own.



Ugra/FOGRA-Medienkeil CMYK-TIFF ©2000 Lizenz: MAH-GT Paul Lindstrom 6FO220200

When validating print according to the ISO 12647 standard it's really only a few colour patches that are specified with 'must be' aim values, given in CIE Lab. The old Ugra/FOGRA Mediawedge will suffice, since it contains colour patches for the primaries CMYK.

This is mainly because almost every digital printing technology uses its own ink sets, so it's said to be very difficult to agree on common aim values regarding the colour values for the primaries used, typically CMYK. While waiting for a dedicated ISO standard for digital printing, if it ever appears, many digital printers learn how to print according to the tolerances of ISO 12647-2, high quality offset, or possibly 12647-7, which is the standard for contract proofing, with tighter tolerances. Alternatively, a third option is to refer to the 12647-8 standard which covers validation proofs, with slightly more generous tolerances than, for example, colour laser printers should be able to meet.

So, printing according to a specified ISO standard means that you control the complete process involved in

producing the colours on paper specified in the standards. For all the printing methods in the 12647 series this means CMYK – there is no standardisation of special colours/spot colours (DIC, Focoltone, HKS, Pantone, Toyo et cetera).

What is specified?

Basically a printer needs to control the printed result so that on a given paper, the solid areas for cyan, magenta, yellow and key, or black, reach a given value expressed in CIE Lab. There are recommendations for what the CIE Lab values should be for the secondary colours, that is when CMY is mixed, creating Red, Green and Blue. But this is actually outside the 'must be' values. Equally there are no absolute values for skin tones or orange, or even greyscales.

Instead the control of the dot gain is meant to give a reasonable control of all the colours between paper white and solid CMYK. It's impossible to give aim values for all the paper types on the market, so in the ISO standard a selection of five paper types is made. For those five paper types, values for paper colour are specified (in CIE Lab),

as well as values for gloss, brightness and mass-per-area. But again, only the aim values for paper colour and gloss are 'must be' (or 'normative' in the language of ISO standards) – the values for brightness and mass are only recommendation (or 'informative' in the language of ISO standards).

Finally the print standards give values for repeatability, including deviation and variation. This means we need to measure and control how big a percentage of the volume is within the specified tolerances. It's not reasonable to expect that every single printed sheet or copy can or will be measured so here we have to delve into statistics. By measuring a large enough number of samples during the print run, the printer can then estimate if a large enough percentage of the prints are within tolerances. The ISO

▶ standard 12647-2, for example, stipulates that at least 68% of the delivered copies should be within the tolerances given. This might seem low, but is estimated to be the volume possible to guarantee with a sample frequency that is reasonable to maintain in daily production, without slowing down the printing process.

How to measure?

Most modern presses are equipped with a sophisticated colour control system, capable of achieving the stipulated aim values for the colours CMYK. Since these are expressed as CIE Lab, it's necessary, at some point, to use a spectrophotometer. A densitometer can't measure the true colour of, for example, Cyan, only how much of what is supposed to be Cyan that is printed. But once the printing process is checked to conform to, for example, ISO 12647-2 on a certain paper type, the press operator can translate the given CIE Lab value to the corresponding density value for that colour.

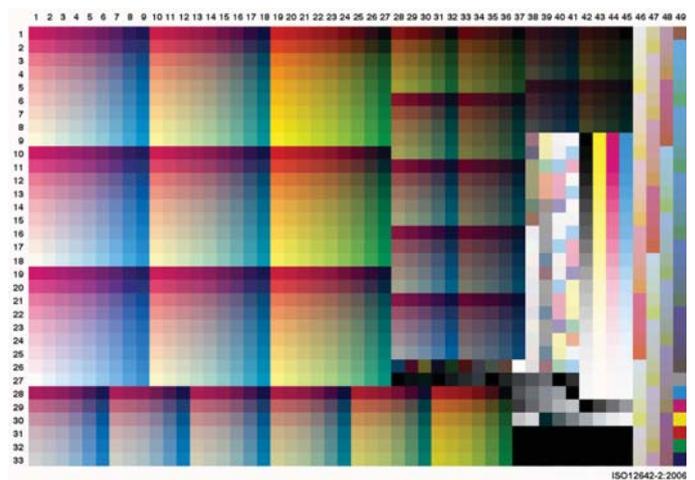
It's sometimes stated that a press operator needs to use a spectrophotometer on the press in order to print according to a given ISO standard, but that is not entirely true – there are ways around this. In other words – printers can't excuse themselves for not being able to print according to ISO standards because they can't afford to buy a new press or press control system. A handheld spectrophotometer should be enough to maintain the quality management.

Besides the state-of-the-art press control systems there are a range of standalone control software to evaluate and validate the printed result, to check if the print is within ISO 12647 tolerances. Among the better known of these is the X-Rite ProfileMaker, which can read the popular UGRA/FOGRA Mediawedge (a control strip containing all the control bars needed to validate ISO 12647 printing). But there are other, perhaps lesser-known tools, in different price brackets such as PrintSpec from UK-based Mellow Colour, Alwan Print Standardizer from Alwan, or different options from the US-based Babel Color.

Most professional proofing systems have a built-in function to validate a contract proof against the ISO 12647-7 standard. There are even share-ware programs that make a reasonable job here, such as ValiProof programmed by Martin Weberg, a former student at

Malmo University department of Graphic Arts. ValiProof can read any standardised test form containing the data that you need for ISO 12647-based printing, and compare the measured values with that which FOGRA has published as normalized aim values on its website.

In reality most printers that want to conform to the ISO print standard need to define and use a generally accepted ICC profile, like for example those in the Adobe Creative suite. For printing on coated paper this means using the so called FOGRA 39 colour characterisation data set, which is possible to download for free from the FOGRA website.



In practice all well-known reference ICC profiles used in ISO-compliant processes are based on a large number of reference colour values, like the new IT8.7/4 test chart containing 1617 colour patches, which is becoming popular especially within packaging printing.

So, any printer that wants to check if they can print according to ISO 12647-2 can't really claim that it needs to be too expensive. Coming back to the shareware ValiProof, all that is needed is to print, for example, an IT8.7/4 test chart, and compare the result with the (free) reference data from FOGRA. Martin Weberg has placed his software under an Open Source license, and anyone interested can download the beta version (in both Windows and Mac OSX version) from Sourceforge.net.

It's about time that both printers and publishers agree on specified terms for quality management, in order to reduce errors and waste, including the time wasted on deciding what file formats to use whether or not proofs and print meet demands regarding the colours. ISO standards such

ValiProof

Proofing data (IT8.7/4)
 Processkontroll-CIPF9000S-Bestr-01
 Open...

Reference data (IT8.7/4)
 FOGRA39L.txt
 Open...

Compare data
 Compare Table...

Descriptive statistics

	ΔE_{76}	ΔE_{00}
Samples	1617.0	1617.0
Mean	1.12	0.72
Median	0.99	0.63
Std. deviation	0.68	0.44
Minimum	0.05	0.04
Maximum	5.53	3.59
90th percentil	1.95	1.24
Skewness	1.88	1.98
Kurtosis	6.18	6.73

Fogra media wedge v3

Criteria	Difference (ΔE_{76})	Tolerance	Status
Paper simulation	0.9	3.0	Passed
Mean of all fields	1.3	3.0	Passed
Max of all fields	4.8	6.0	Passed
Max of primary colors	1.4	5.0	Passed
Max ΔH of primary colors	0.9 ΔH	2.5	Passed
Mean ΔH of composed grey fields	0.4 ΔH	1.5	Passed

IDEAlliance hard copy proofing

Criteria	Difference (ΔE_{76})	Tolerance	Status
Average of all	1.1	1.5	Passed
95th percentil	2.3	6.0	Passed
Cyan	1.4	5.0	Passed
Magenta	1.3	5.0	Passed
Yellow	1.4	5.0	Passed
Red	2.0	5.0	Passed
Green	1.1	5.0	Passed
Blue	0.6	5.0	Passed
50/40/40 grey	0.6	1.5	Passed
Paper white L*	0.8	2.0	Passed
Paper white a*	0.1	1.0	Passed
Paper white b*	0.3	2.0	Passed

Only having a small budget is not a good enough reason for a printer not to print according to ISO-standards. The ValiProof software is a shareware program developed by Martin Weberg, a former student at Malmo University, which does a decent job when checking print for ISO compliance.

as PDF/X for the files, and ISO 12647 for print, should be understood and used to a much greater extent than at present. As we have shown here, it's not that difficult or expensive to obtain the knowledge, technology or software needed to apply it.

- Paul Lindström

