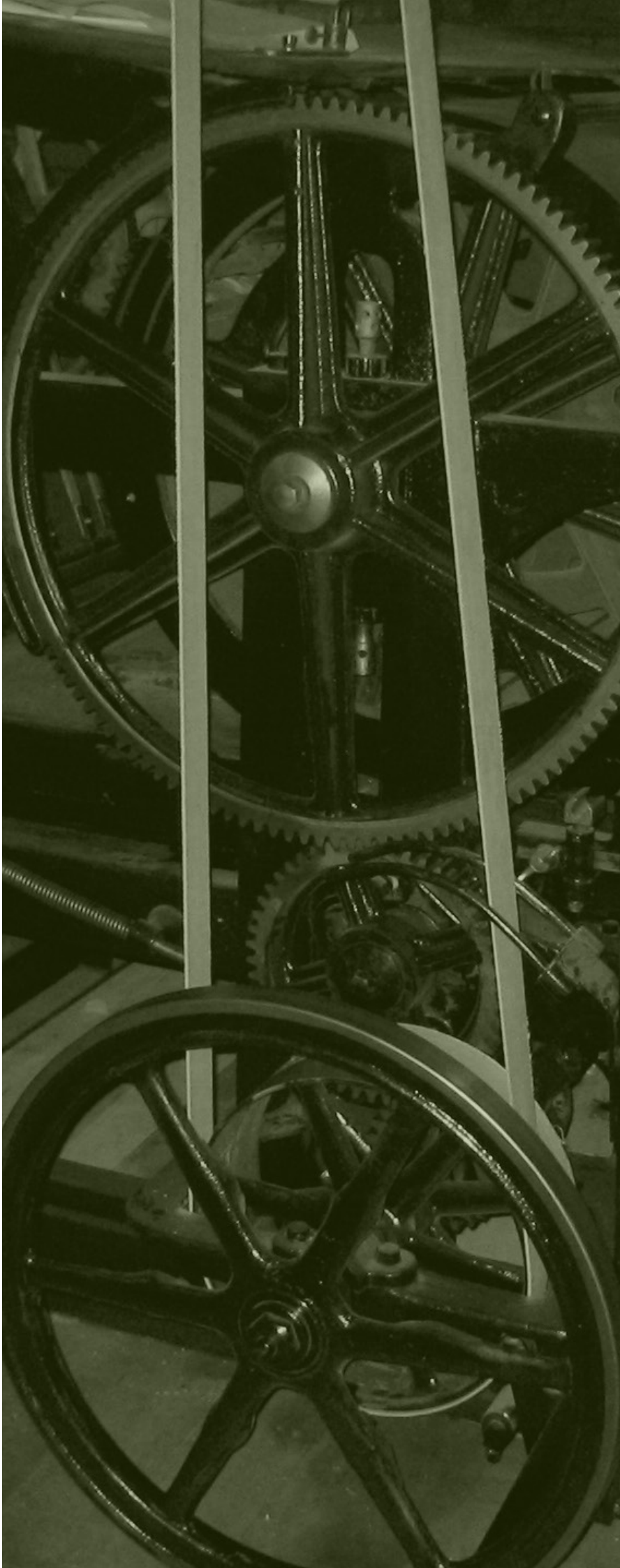
# Standardised Print Production (SPP)

## Accredited certification according to ISO 12647-2

## Part 2:
## Setting Up The Press



A Digital Dots Publication

# Standardised Print Production (SPP)

## Achieving accredited certification according to ISO 12647-2

### Technical Reference Part 2:

### Setting Up The Press

Digital Dots

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# Introduction

Over the last few years we have been heavily involved in standards work, working internationally with ISO and print federations in both Sweden and the UK. The Digital Dots Standardised Print Production (SPP) series explains what printing companies and print media buyers need to know about using the ISO 12647-2 standard for offset lithography process control. This standard can also provide a useful framework for digital press quality control.

The complete series includes standalone documents describing what you need to do in prepress, on press, and for overall quality assurance. An executive summary covers the key points in a separate document. Altogether the series provides all the information required to understand, implement and exploit ISO 12647-2 for high quality production control and colour prints, adding value, business performance improvement and competitive edge for print producers and media buyers. This part of SPP covers requirements for *press calibration and validation of the prints*, in order to comply with ISO 12647-2. This foundation work must be done, if a printer wants to fully implement the ISO 12647-2 standard.

SPP: Setting Up the Press is organised in sections and following each section, there are short summaries of what the requirements mean specifically for a print media buyer and a print media producer. Parts 1 and 3 of SPP provide what you need to know for prepress and quality assurance. An executive summary is included in the series for the people not directly involved in production or print buying, but who have a commercial interest in the successful implementation of ISO 12647-2. See digitaldots.org.

### For the Print Buyer

These synoptic boxes provide print buyers with a quick section summary. Use them if you don't want to bother with the background and explanations. What's listed in these paragraphs can serve as a checklist.

### For the Printer

These synoptic boxes are for printers. They provide a quick section summary, if you don't want to bother with the background and explanations. What's listed in these paragraphs can serve as a checklist.

# Standardised Print Production (SPP)

SPP provides printers with a defined procedure for print production to guarantee both high print quality and cost effective production processes. The SPP guides follow international

standards for graphic arts production and are consistent with established certification schemes based on ISO 12647-2. They integrate the core elements of ISO 9001 (requirements for quality management systems) with ISO 12647-2.

The SPP guides provide everything prepress professionals, publishers and printers need to know in order to produce high print quality and cost effective production processes. They provide all of the details required in order to prepare for (and hopefully pass) an accredited ISO 12647-2 audit. The guides support all international certification schemes including those of the BPIF, The Swedish Printers Federation, Fogra, UGRA and IDEAlliance.

SPP does not require a full ISO 9001 implementation, however it does include some critical components relating to customer satisfaction, planning, measurements, analysis, improvements and control of non-conforming products. All of these are vital for successful and systematic quality control and colour management. Properly implemented they should improve overall efficiency and lead to enhanced business performance.

### What This Means for the Print Buyer

You can use the SPP guide to improve your understanding of ISO 12647-2 and what is required of a printing company in order to achieve it. Work with your printer to make sure you have a complete understanding of their file delivery, preflight, proofing, viewing conditions and colour control requirements. All of these should be based on the requirements in ISO 12647-2.

### What This Means for the Printer

The SPP guide gives you everything you need for a successful implementation of ISO 12647-2. Use it to prepare for audits and certification and/or to demonstrate to customers your ability to reach the standard. Make sure you communicate fully the value of this to your customers.

## The Importance of Independent Certification

There are many ways in which a printing company can shout about its quality control using ISO 12647-2. Compliance is a simple claim that states that the printing company follows the primary process parameters and technical requirements of the standard. But it is no guarantee of a quality result. Some developers and industry associations have their own procedures, and issue certificates for compliance.

Keep in mind that a certificate's value depends on who has done the audit prior to the certification, and the scope of their authority. Only accredited and qualified external auditors can provide independent and unquestionably credible certification to ISO 12647-2. An external audit is also invaluable for printers who want independent recognition of their production quality control standards.

Such certification is robust and credible, which is why it is so valuable for printers who want formal recognition for their production quality. It can also be an incidental aid to cost control and business performance improvement because compliance with a rigorous management and production scheme can help a business to get production and related factors under complete control. Certification is also of value to print buyers because it provides assurance that service providers can achieve a specified output quality, measured and judged to a robust compliance scheme. This in turn helps print buyers ensure value for money and to help them to select print service providers on the basis of proven and qualified competence.

Certification provides print buyers with assurance that service providers can achieve a specified output quality and helps them to ensure value for money. However print buyers should be wary of certifications provided by organisations that are also consultants to the company or which have related products to sell.

### What This Means for the Print Buyer

If you want high quality colour prints you really should be working with a printer who understands ISO 12647-2. Ask your print provider about their level of conformance to international standards and how it is demonstrated. Make sure that you specify on all print orders that you want output quality that is compliant with ISO 12647-2 and be clear that this means the printer should be prepared to provide you with copies of certificates of compliance. Make sure the certificates are current.

### What This Means for the Printer

If you are selling work on the basis of ISO 12647-2, make sure that you are able to fully demonstrate that you can meet the standard. Make sure your company is formally certified, either through an independent organisation or an industry association, and that your staff know how to communicate the information.

# ISO 12647-2 in Context

ISO 12647-2 is one of several standards in the ISO 12647 series that standardise the control parameters for various printing processes. Each part in the series is specific to a different print method. 12647-2, the part for offset lithography, is the most widely implemented. Various bodies, such as the British Printing Industries Federation, the Swedish Printers' Federation, FOGRA in Germany, UGRA in Switzerland and IDEAlliance in the US, have developed certification procedures for ISO 12647-2, with more or less rigour. They provide certificates to companies who pass their series of tests for compliance.

Rather than develop our own certification procedures, Digital Dots has worked with certifying bodies and certification scheme developers. With SPP, we have developed comprehensive guidelines for implementing ISO12647-2 that are easy to follow and inexpensive to apply. These guidelines are based on work that we have done with the Swedish Printers Federation and the British Printing Industries Federation, to assist with the development of their certification schemes.

# Useful ISO Standards

SPP refers to several ISO standards listed here. You should be familiar with all of them to some extent in order to fully and successfully implement ISO 12647-2. All of these standards are very useful, but we particularly recommend that you invest in ISO 12647-2 and ISO 9001.

| | |
|---|---|
| ISO 12647-1 | Parameters and measurement methods |
| ISO 12647-2 | Offset lithographic processes |
| ISO 12647-7 | Proofing processes working directly from digital data |
| ISO 2846-1 | Colour and transparency of ink sets for four-colour printing |
| ISO 3664 | Viewing conditions – Graphic technology and photography |
| ISO 9001 | Quality management systems – Requirements |
| ISO 12642 | Input data for characterisation of four colour process printing |
| ISO 12646 | Displays for colour proofing |
| ISO 13655 | Spectral measurements and colorimetric computation for graphic arts images |
| ISO 15076 | Image technology colour management (ICC profiles) |
| ISO 15930 | PDF and prepress digital data exchange (PDF/X) |

# Standardised Print Production: Setting up the Press

## Preamble

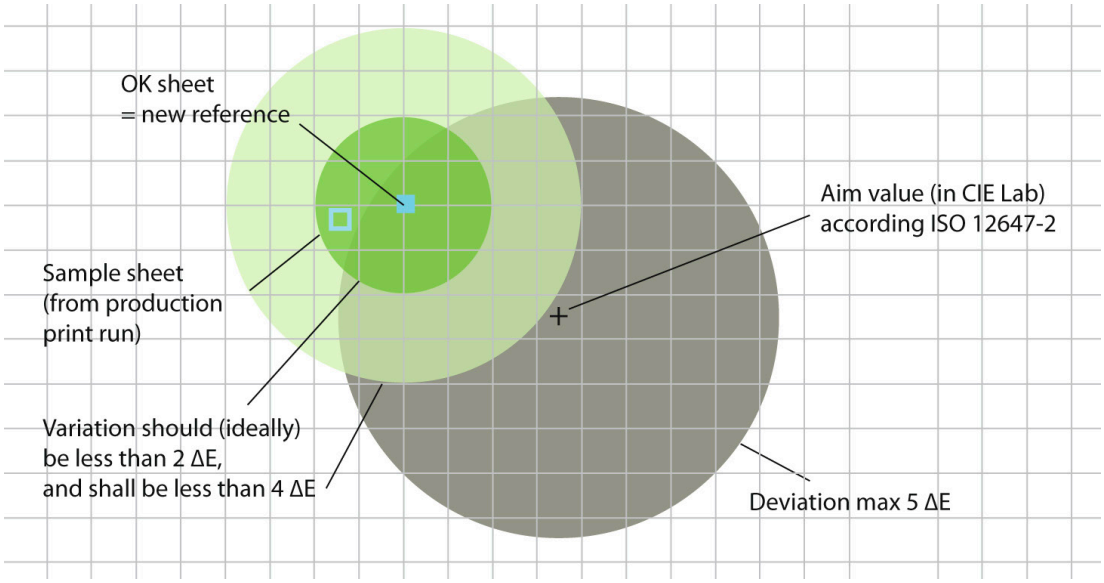
Understanding how the press performs, its strengths, weaknesses and foibles will determine most of your production quality parameters. The press's architecture and design determines its output capabilities however there is much that can be done to optimise this. You can control colour appearance using specific reference aim values as outlined in ISO 12647-2. These controls can also be used on a digital press, if it has the technological capacity to match offset.

## The importance of reference data and tolerances

The 12647-2 standard only contains references to specified aim values for the process colour solids (primaries), and for two-colour overprints (secondaries, RGB) and a three-colour overprint (C+M+Y). However in order to produce real life colour separations of images, a much more extended colour reference is required. Test forms compatible with ISO 12642, often referred to as IT8 test forms, provide this reference but an alternative and commonly used test form is the ECI 2002 chart. ICC profiles are created by measuring such test forms. An ICC profile is a collection of data that summarises the characteristics of a particular input or output device, according to the ICC's criteria.

Custom-made ICC profiles should conform to the ISO 12647-2 standard. Alternatively the printer and publisher can decide to use standardised ICC profiles, created by organisations such as Adobe or ECI (European Color Initiative). However even using the same measurement or characterisation data, the ICC profiles can produce quite different results on the separated images. This is due to the settings that are used when making the ICC profile and which can influence the data. This includes such things as the black generation settings and maximum tone value sum allowed (more commonly referred to as TIC, Total Ink Coverage, or TAC, Total Area Coverage).

So the appearance of the final prints can actually vary, depending on the software you use to create ICC profiles and the colour settings you have selected. Even using the same characterisation data, such as the FOGRA 39 normalised characterisation data or IDEAlliance G7, you may have substantial variations in the appearance of the printed images. But the values for the solids of the




As mentioned in a Part 1 of these SPP guides, for an ISO-compliant print run the OK-sheet shall have a smaller colour deviation than 5 ΔE (Delta E). The variation during the print run should ideally not exceed 2 ΔE, and shall not exceed 4 ΔE.

primaries, and the values for secondary colours will be the same, independant of the ICC profile that is used. This is because they represent the outer gamut of the colour space described by the characterisation data set. The tolerances referred to in the ISO 12647-2 standard only relate to the measured solids for the primaries, secondaries and a three-colour overprint (mentioned above), and use the ΔE (Delta E) formula to calculate colour difference,. The formula currently used in ISO 12647-2 is the original 1976 formula which uses straight CIELab values. Since 1976 more advanced formulas for calculating colour differences have been introduced, so if you use formulas other than $\Delta E_{76}$, this should be clearly communicated to the customer/print buyer along with an explanation of why you have chosen to do so.

The reference values used for selected ICC profiles should also be communicated. A good starting point is the Characterisation Data Registry on the ICC web site (http://color.org/registry2.xalter). This database contains ISO 12647-2 compliant reference characterisation data sets from Europe, Japan and the US.

## Printing Controls

Paper is the focal point for printing process calibration. The ISO 12647-2 standard is based on five paper types. They are defined with CIELab values for the paper whiteness, but gloss, ISO brightness and weight (mass-per-area) are also specified.

## Paper

When measuring printed sheets, a black background is often used to reduce the influence on colour appearance of the surface beneath the sheet. This black background also reduces the

effect of what is printed on the back of the sheet. However test forms used for characterisation (creating ICC profiles) are often only printed single sided and are commonly measured with a white background. There is no reason to measure with a black background if you are printing on thicker papers, as there is no likelihood of show-through. For these reasons reference values are given in the standard for both black and white backing in the measuring process. The black backing values are the normative values, which means they are requirements, whereas the values with white backing are for information only.

**Table 4 – CIELab values, gloss, weight and tolerances for paper types**

| Paper Type | Lab values (black backing) | | | Lab values (white backing) | | | Gloss | Weight |
|---|---|---|---|---|---|---|---|---|
| | L | a | b | L | a | b | | |
| PT 1 (gloss-coated) | 93 | 0 | -3 | 95 | 0 | -2 | 65 | 115 |
| PT 2 (matte-coated) | 92 | 0 | -3 | 94 | 0 | -2 | 38 | 115 |
| PT3, web offset LWC | 87 | -1 | 3 | 92 | 0 | 5 | 55 | 70 |
| PT4, Uncoated | 92 | 0 | -3 | 95 | -2 | 6 | 6 | 115 |
| PT5, Uncoated, yellowish | 88 | 0 | 6 | 90 | 0 | 9 | 6 | 115 |
| Tolerance (+/-) | 3 | 2 | 2 | 3 | 2 | 2 | 5 | - |

Note: For full details of measurement specifications and complementary notes to this table see the ISO 12647-2 standard, Table 1 in the 2007 Amendment.

What isn't shown in table 4 above is if the paper contains OBA (Optical Brightening Agents), and this is actually rarely, if ever, stated by the paper manufacturers. We describe the effect of OBA and how you can deal with it in the section on grey balance on page 12. There is work underway within the ISO technical committee for the graphic arts to standardise ways to measure and communicate the amount of OBA in paper, in particular in the coming ISO 15397 standard for communicating graphics paper properties. As of today special attention needs to be paid to OBA when measuring substrates.

## Ink

With respect to paper whiteness, brightness and printability (TVI considerations et cetera) Paper Types 1 and 2 in ISO 12647-2 can be treated as a single type, so you can use the same ICC profile. This means that for the five ISO defined Paper Types there are four different colour gamuts.

The boundaries for these colour gamuts can be plotted in a 3D space using the obtained values for the primaries, secondaries, black, overprint black (C+M+Y) and paper white. This aids in appreciation of the limits of the four colour spaces, for example when evaluating a particular proofing system.

### Table 5 – CIELab values for primaries, secondaries and overprint

**Lab values from ISO 12647-2 (written as L,a,b)**

| Paper Type | Black | Cyan | Magenta | Yellow | Red (M+Y) | Green (C+Y) | Blue (C+M) | C+M+Y |
|---|---|---|---|---|---|---|---|---|
| 1&2 – black bkng | 16,0,0 | 54,-36,-39 | 46,72,-5 | 87,-6,90 | 46,67,47 | 49,-66,24 | 24,16,-45 | 22,0,0 |
| (white backing) | 16,0,0 | 55,-37,-50 | 48,74,-3 | 89,-5,93 | 47,68,48 | 50,-68,25 | 24,17,-46 | 23,0,0 |
| 3 – black bkng | 20,0,0 | 55,-36,-44 | 46,70,-3 | 84,-5,88 | 45,62,39 | 47,-60,25 | 24,18,-41 | 22,0,0 |
| (white backing) | 20,0,0 | 58,-38,-44 | 49,75,0 | 89,-4,94 | 47,67,43 | 50,-64,27 | 25,20,-44 | 23,0,0 |
| 4 – black bkng | 31,1,1 | 58,-25,-43 | 54,58,-2 | 86,-4,75 | 52,53,25 | 53,-42,13 | 37,8,-30 | 32,0,0 |
| (white backing) | 31,1,1 | 60,-26,-44 | 56,61,-1 | 89,-4,78 | 54,55,26 | 54,-44,14 | 38,8,-31 | 33,0,0 |
| 5 – black bkng | 31,1,2 | 59,-27,-36 | 52,57,2 | 86,-3,77 | 51,55,34 | 49,-44,16 | 33,12,-29 | 31,0,0 |
| (white backing) | 31,1,3 | 60,-28,-36 | 54,60,4 | 89,-3,81 | 53,58,37 | 50,-46,17 | 34,12,-29 | 32,0,0 |

Note: For full information on measurement specifications and complementary notes to this table see the ISO 12647-2 standard, Table 2 in the 2007 Amendment.

For coated paper, the FOGRA 39 characterisation data set is one of the most commonly used. This data set is built from samples from a range of different press types for Paper Types 1 and 2. It should be noted that the Lab values for the secondaries differs slightly in FOGRA 39 compared to what is stated in the ISO 12647-2 standard. This is because linear plates were used to develop the data and FOGRA engineers normalised the TVI values using the Heidelberg PrintOpen software. The values were applied prior to printing. If you compensate for TVI already in the RIP, or make your own custom ICC profiles, you will most likely notice similar small differences compared to the FOGRA 39 characterisation data set. More information on considerations for which ICC profiles to use is provided in Part 1 (Prepress) of SPP, in the section about different ICC profiles.

**Table 6 – CIELab values for FOGRA 39 (ICC profile ISOcoated_v2_eci.icc)**

**Lab values from ISO 12647-2 (written as L,a,b)**

| Paper Type | Black | Cyan | Magenta | Yellow | Red (M+Y) | Green (C+Y) | Blue (C+M) | C+M+Y |
|---|---|---|---|---|---|---|---|---|
| 1&2 (white backing) | 16,0,0 | 55,-37,-50 | 48,74,-3 | 89,-5,93 | 47,68,48 | 50,-65,27 | 24,22,-46 | 22,0,0 |

While the Lab values for secondaries and overprint are important, they are only informative so they are not required in order to comply with ISO 12647-2. If you are working to comply with an ISO 12647-2 certification scheme, make sure to check the details of this requirement. The primaries are normative, which means they are absolutely requirements for ISO 12647-2 compliance. The tolerances for the primaries are shown in table 7. The additional calculation of ΔH is a measure of hue difference, for Cyan, Magenta and Yellow. This calculation can be done with most production colour management software or in the control system on the press. While allowing a colour variation of up to 4 ΔE (5 ΔE for yellow) between the OK sheet and the sample production sheet could be seen as too generous, checking that the difference stays within ΔH 2.5 ensures that the visual appearance stays within reasonable limits.

**Table 7 – Delta E (ΔE) values for tolerance on the primaries**

| | Black | Cyan | Magenta | Yellow |
|---|---|---|---|---|
| Deviation | 5 | 5 | 5 | 5 |
| Variation | 4 | 4* | 4* | 5* |

Note: * ΔH max 2.5. From Table 3 in the ISO 12647-2 standard, the 2007 Amendment.

The ISO 12647-2 standard states that at least 68% of the printed copies should not exceed the tolerance for variation. This very exact number is borrowed from statistical analysis, achieving a Sigma level of 2 or Standard Deviation of 2 or in other words, within 1 standard deviation of the mean (average). Further information on the use of Standard Deviation for quality management control is provided in SPP Part 3 (Quality assurance) along with a description of Six Sigma, a set of strategies and tools to aid process improvement. In practice the printer has to measure sample sheets frequently enough to ensure that the majority of the print run is within tolerance. In some certification schemes other, and sometimes more specified and stricter, tolerances are applied on deviation and variation. There may also be different tolerances needed on short run production and for example very long print runs in web offset production. The present ISO 12647-2 standard itself is not very specific on this.

In this context it's probably worth remembering that target values in the previous tables all refer to entirely dry ink and paper. Spectral readings are influenced by how long the print has had to dry. Colours aren't fully stabilised until after 24 hours, so the measurements may not be accurate if they are taken on wet prints. The situation is somewhat different for heatset printing and printing with UV ink using inline drying technology. The inkset assumed in ISO 12647-2 meets the ISO 2846-1 standard (Colour and transparency of ink sets for four-colour printing – sheet-fed and heat-set web offset lithographic printing).

Measurements should be made with a spectrophotometer. The CIELab aim values must be fully determined in a dry-back calculation, which establishes the aim values to use on press. Only then can the print run, when dry and delivered to the customer, be sure to be within the ISO 12647-2 tolerances. These aim density values can be calculated and used, if preferred, as part of your daily process control. If the daily process control uses calculated density values as target values, regular validation is required to ensure that those density readings produce correct CIELab values on dry sheets. The press operator must have CIELab values and/or density values to hand for the relevant press, paper, ink and dampening settings.

## What This Means for the Print Buyer

There are many factors influencing the appearance of the final printed result. The more critical ones are often summarised in the print report the press control system generates. If you want to make sure that your print order was printed within the ISO 12647-2 tolerances, you can ask to see a copy of the summary of the print report. Ask the printer to explain how to interpret the numbers and graphs: the key parameters are actually not that difficult to get to grips with. Focus on aim values for CMYK, expressed as CIELab, and also check the dot gain variation (TVI).

## What This Means for the Printer

Once you have decided which ICC profile to use for the production paper at hand, the aim values can be expressed either in CIELab, or as density values. However, the ISO standard only offers reference values for completely dry sheets, and the database in the press control software contains reference values for wet print, so a dry-back calculation must be made.

## Tone Value Increase (previously known as dot gain)

In addition to defining aim values for solids of the primaries, the ISO 12647-2 standard uses defined and normalised sets of ideal curves for dot gain, called TVI (Tone Value Increase), to control the gradation of the halftones. There is a limited number of these TVI-curves, named A to F in the standard. They correspond to the expected TVI for CMY and Black on the one hand, and the expected TVI for the five different paper types specified in ISO 12647-2, on the other hand.

The A-F curves are also dependent on whether positive or negative repro film is used, so they are not entirely relevant when outputting direct to plate using a Computer-to-Plate system (CTP). Still they can be used as a reference when building ICC profiles. Curve A corresponds to the TVI curve for CMY on Paper Type 1 and 2 (when using positive films and plates), while curve B corresponds to expected TVI for Black on Paper Type 1 and 2. By adjusting the internal CTP curves in prepress it's possible to conform to the general ICC profiles such as ISO Coated v2 (from ECI), even when using different screen rulings and screen types.

### Table 8 – TVI curves

| Paper Type | Curve A | Curve B | Curve C | Curve D |
|---|---|---|---|---|
| 1 and 2 | CMY | K | | |
| 3 | | CMY | K | |
| 4 and 5 | | | CMY | K |

Note: To see a graph of all the A-F TVI curves see ISO 12647-2 Figure 2. To get numerical tone values in 5% steps see the "Medienstandard Druck 2007", from bvdm (Bundesverband Druck und Medien)

### Table 9 – TVI tolerances

| Tone value (%) | Deviation on OK sheet (%) | Variation in production (%) |
|---|---|---|
| 40 or 50 | 4 | 4 |
| 75 or 80 | 3 | 3 |
| Maximum mid tone spread | 5 | 5 |

Note: For full information and complementary notes on this table see the ISO 12647-2 standard, Table 5.

One of the most important measuring devices in print production is the spectrophotometer. This should be serviced and calibrated regularly by an ISO 17025 accredited laboratory.

### What This Means for the Print Buyer

Once the correct ICC profile for a specific paper has been selected, it's up to the printer to maintain the equivalent dot gain, in order to reproduce the midtones smoothly and with the correct tone value. If the images look too light or dark, ask to see a copy of how the TVI was controlled during the print run. This should provide information for correcting the problem.

### What This Means for the Printer

In order to use one common ICC profile for a certain paper, it's important to check that the TVI on all presses used for ISO 12647-2 compliant production can be run with the TVI within tolerance.

## Grey balance

ISO 12647-2 does not emphasise the necessity to achieve grey balance on press and the values suggested here are only for your information and are informative, rather than an absolute requirement of ISO 12647-2. SPP recommends adding grey balance control to the control methods and suggests a formula for calculating a paper-relative grey balance. This formula for

substrate correction was developed by members of the committee responsible for the ISO 12647 series of standards. It is especially useful when printing on papers that are slightly outside the tolerances for the five paper types specified in ISO 12647-2. This solution applies if it's difficult to find a paper on the market that falls within the tolerances, such as a paper that uses a lot of Optical Brightening Agents (OBA). If, using CIELab, the b-value for paper white has a much larger negative value than expected this is an indicator that the paper contains OBA. The OBA chemicals in the paper respond to UV light, which shows up in the measurements as a violet tone in the paper when using a spectrophotometer without a UV filter. This UV light is not visually detected as violet, but it makes the paper appear a more cool white, than it would if no OBA were used. The paper manufacturers tend not to publish details of the amount of OBA in papers in their technical specifications. However, the presence of OBA can cause problems in colour management, especially when creating ICC profiles that are also expected to perform well for contract proofs which may be printed on substrates with less OBA.

The formula presented below is intended to help both when the presence of OBA in the production paper is suspected and when the paper's whitepoint is different to the values in the standard. This formula has been suggested for inclusion in the next version of the ISO 12647-2 standard.

When dealing with papers that you suspect contain high amounts of OBA, typically uncoated papers, it helps if the spectrophotometer can perform measurements according to the M1 measurement illumination condition listed in the ISO 13655 standard (Spectral measurements). This measurement was defined to reduce variations in measurement results between instruments due to fluorescence. More and more spectrophotometers support this mode, which means measuring with a D50 light source, including the UV part of the spectrum (with no UV filter applied).

**Table 10 – Grey balance**

| Tone value | Cyan (%) | Magenta (%) | Yellow (%) |
|---|---|---|---|
| Quarter tone | 25 | 19 | 19 |
| Midtone | 50 | 40 | 40 |
| Three-quarter tone | 75 | 64 | 64 |

Note: For full information and complementary notes on this table see the ISO 12647-2 standard, Table C.1.

To calculate a paper relative grey balance the following formula can be used:

$a^* = a^*paper \times (1 - 0.85 \times (L^*paper - L^*) / (L^*paper - L^*cmy))$

$b^* = b^*paper \times (1 - 0.85 \times (L^*paper - L^*) / (L^*paper - L^*cmy))$

The tone values of cyan, magenta and yellow leading to a visually neutral grey should be calculated from the standard printing condition or actual printing condition or the associated profiles by the formula. It describes the grey reproduction (L*, a*, b*) with respect to a given paper colour (L*paper, a*paper, b*paper) and CMY-overprint (L*cmy) for each L* in the range from L*paper to L*cmy.

In summary the printed sheets should contain control strips with:

- C, M, Y and K at 100%
- Red (M+Y), Green (C+Y) and Blue (C+M) to check trapping
- Two or three patches of each of the primaries at tone values of 40 and 80% or 25, 50 and 75%
- Grey balance patches of CMY to compare to the corresponding tone value for K only.

If there is not enough space on the sheet for a complete control strip, small grey balance checkers should at least be used as is typically the case in web offset production.

## What This Means for the Print Buyer

If you want to check if the prints are compliant to ISO 12647-2, ask the printer to make untrimmed sheets available for measurements. You must measure the control bars to check that the tolerances for colour deviation of the primaries and TVI are not exceeded. It's important to use a high end spectrophotometer for this, properly calibrated and serviced.

## What This Means for the Printer

Make sure to pull sufficient samples during the print run to ensure that variations do not exceed the ISO 12647-2 tolerances. It is mainly the aim values for the full tone values of the CMYK primaries and TVI that are mandatory, but the secondaries (RGB) and grey balance must also be measured and controlled.


A systematic approach to monitoring and measuring all the critical sub processes of print production is the core of working to ISO standards.

## Registration & the smallest dot

ISO 12647-2 specifies tolerances for registration (image positioning) and the smallest printable screen dot size (tone value reproduction limits) for paper weights over 65 gsm. The registration should be within 0.08 millimetre, which is very hard to determine with the types of loupes normally used in production. But using a loupe with a millimetre scale makes it possible to detect registration values of 0.1 millimetre, which SPP recommends for the registration tolerance.
As a minimum, screen dots of 3% and 97% should be reproduced consistently.

## Next Steps

Publishers, print buyers and print media producers need to understand all of the topics covered in this part of SPP in order to fully implement ISO 12647-2. Other parts of SPP address the requirements for prepress (Part 1), overall quality control for the business (Part 3), and finally provide an executive summary for the people not directly involved in production or print buying, but who have a commercial interest in the successful implementation of ISO 12647-2.

# About the authors

## Laurel Brunner

Laurel started her career in 1978 as an accountant for a printing company. Since then she has worked exclusively in the prepress and publishing industries, with a particular specialisation in digital prepress, digital production and digital printing. She is managing director of Digital Dots, an international consulting group, and publisher of Spindrift. This is the industry's only independent, subscriber supported newsletter for the graphic arts, printing and publishing industries.

Laurel is active in standards development through her work with several ISO committees and is the convenor of ISO's Working Group 11 which is developing standards related to the environmental impact of print.

## Paul Lindström

Paul Lindström entered the graphic arts industry in 1980 as a typographer and graphic designer. He has worked in computer assisted graphic design and print production ever since. Paul was the production manager and owner of a commercial printer where he became involved with digital printing, before moving to Elanders' Electronic Printing division. During his three years with Elanders Paul played a key role in developing the company's variable data management and print on demand strengths.

Between 1993 and 2003 Paul worked as technical editor for AGI, Scandinavia's leading graphics arts trade magazine. In addition he lectured part time for the Graphic Arts Department at Malmoe University, running degree courses on digital imaging, colour and quality management, the optimisation of workflow systems and production processes. Since 1998 Paul has been an UKAS accredited auditor for ISO 9001 and ISO 12647 certification, and is the co-editor of the certifications schemes in both Sweden and the UK. He is an appointed expert to ISO TC130, the technical committee responsible for authoring ISO standards for graphic arts and print media production.

Digital Dots is an independent graphic arts research group established in 1999. The company specialises in technology evaluations for digital prepress, printing and publishing applications and has conducted technology tests since its inception. Digital Dots also provides exclusive market research, testing and evaluation services for developers and buyers and is the publisher of Spindrift, a subscriber supported journal for the graphic arts.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