Standards in offset printing – an overview and updates I

The print media world is governed by norms, standards, guidelines and regulations. But which ones are relevant to us and what is new in these standards?
Around the globe, there are numerous regionally applicable regulations and standards. They include, inter alia, the Process Standard Offset for the German-speaking area, the JapanColor Characterization Data for the Asian region, the guidelines and characterizations of the 3DAP – Digital Data Delivery for Australian Productions as well as the GRACoL General Requirements for Applications in Commercial offset Lithography and the SWOP Specifications for Web Offset Publications for the printing industry in the US.
The most important internationally applicable basic regulations, are, however, the ISO standards. The ISO International Standards Organisation prepares standards for all spheres of life, only excluding the electrical industry, and thus also for the printing industry including the associated industries. A short survey of all ISO standards that are important for offset printing is given below:

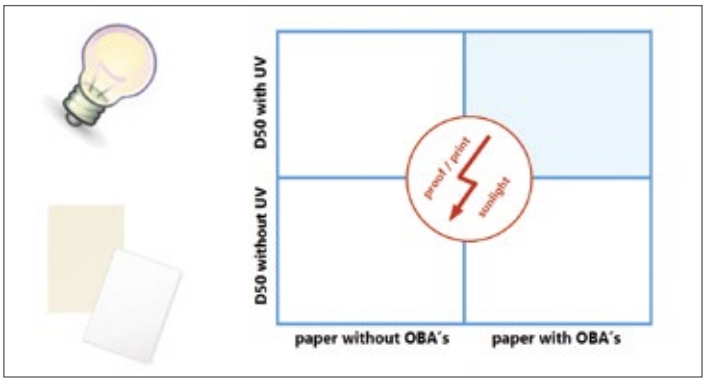
- ISO 12647-2 – Standard re process control in offset lithographic processes
- ISO 12647-3 – Standard re process control in coldset offset lithograhy on newsprint
- ISO 12647-4 – Standard re process control in publication gravure printing
- ISO 12647-5 – Standard re process control in screen printing
- ISO 12647-6 – Standard re process control in flexographic printing
- ISO 12647-7 – Standard for proofing processes working directly from digital data

Due to the different materials and process technologies being used, the standards cannot be applied in every printing process without any difficulties. In offset printing, however, the standards are of rather great importance. It is everyone`s own decision whether to seek certification according to ISO or to use the standards only as a guide for the company`s own standards. The most important standard for sheet-fed offset printing is ISO 12647-2:2009, which was replaced by the new standard ISO 12647-2:2013. However, it will take some time until these new provisions will actually be applied in the daily routines of printing companies, agencies and the end customers. To make that easier, this article will briefly explain the most important new provision. Much of what is specified therein refers to other parts of further standards as, e. g.:

- ISO 13655 – Spectral measurement modes M0, M1, M2, M3
- ISO 3664 – Viewing conditions/ Light source
- ISO 2846 – Standard for printing inks
- ISO 15397 – Graphic paper properties/ Degree of brightening

The basic production guidelines, target values and tolerances are defined in ISO 12647-2 with the aim to reach uniform, predictable and constantly reproducible print results at a consistent quality level independent of the technical conditions. Furthermore, the print services provider is enabled to increase automation, to evaluate all results using technical instrumentation and to remove potential sources of errors fast and systematically.

Due to technical innovations and, above all, new paper properties, there are crucial novelties in the ISO 12647-2:2013.



The previous problem

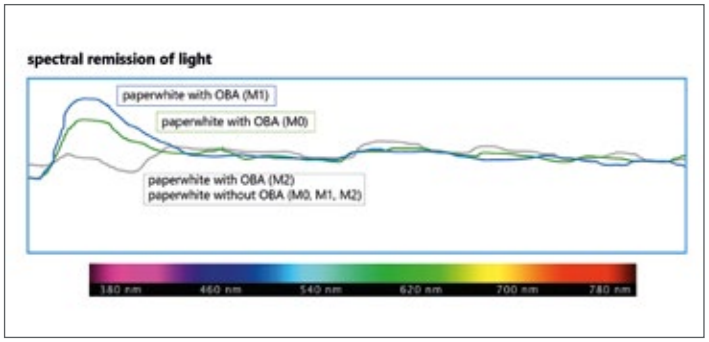
The D50 standard light for the graphic arts industry describes a neutral colour temperature and is based on a light source in Central Europe approximating a partly cloudy sky. What had not been taken into consideration is the UV portion in this light source. In contrast to sunlight, which has a high proportion of UV components, only a low, undefined UV component was factored in in measurements and the ambient light. During recent years, however, interest in paper grades with optical brighteners, the so-called OBAs (optical brightening agents), has risen. Due to the reaction of the fluorescent substances in paper with the UV component in the light, there are differences in the perception of colour under different light sources. This means that a printed product printed on a paper with a high proportion of OBAs has a bluer appearance under sunlight than under standard light with only a very low proportion of UV component.

Therefore, ISO 12647-2:2013 is based on new measuring conditions and papers have been reclassified, also in view of the number of optical brighteners.

Measuring conditions according to ISO 13655:2017

In order to be able to record the effects of the optical brighteners in the total environment of the printing company also with measurement instrumentation, the measurement conditions M0, M1, M2 and M3 were already defined in ISO 13655:2009. This standard was revised by ISO 13655:2017.

For the colour measurement of proofs and printed end products, ISO 12647-2:2013 requires measurement mode M1 to be used. The measuring mode can be set in all recent spectrophotometers. If printed products, printed according to the old standard, are available as a sample and if the colours are to be compared effectively, measurement mode M0 can be used. For measurement during printing with an active polarization filter, measurement mode M3 can be used.



M0	D50 with an undefined UV component	No polarization filter	Conventional colour measurement until FOGRA 50
M1	D50 with a high, defined UV component	No polarization filter	Physical, correct colour measurement taking into account the brightening – FOGRA 51 / FOGRA 52
M2	D50 without UV component	No polarization filter	"UV Cut" colour measurement, completely without UV component
M3	D50 without UV component	With polarization filter	Spectral and densitometric colour measurement in printing with wet-dry compensation

Brightening degree of printing paper

In the production of paper, more and more optical brightening agents (OBAs) are being added to the paper; furthermore fluorescent substances in order to make the paper brighter, whiter and thus more attractive. This applies, in particular, to uncoated grades, but also many special papers. In order to determine the amount of OBAs, you have to compare the paper white values measured by means of a spectrophotometer under measurement conditions M2 and M1. The brightening degree can be determined by comparing the difference between the b-values. The paper industry calculates it by means of the UV index.

Brightening degree	Printing industry Δb (M1-M2) according to ISO 13655 (0°/45°, 2° standard observer)	Paper industry ΔB UV-Index according to ISO 2470-2 (D65 brightness, 10° standard observer)
no	0 – 0.5	0 – 1
weak	0.5 – 1.8	1 – 4
low	1.8 – 3.6	4 – 8
medium	3.6 – 6.3	8 – 14
strong	6.3 – 11.3	14 – 18

The effects of the ambient light on the reproduction of colours can be seen when looking at the brightening degree. If the Lab-value of paper white is approximately the same under measuring conditions M1 and M2, the paper does not contain OBAs and the influence of the UV component on the reproduction of colour equals zero. The higher the difference between the b-values, the higher the influence of ambient light with and/or without a UV component.

Further details regarding the new paper classification and printing condition will be given in the next edition of the Printers` Guide.

Color matching conditions according to ISO 3664:2009 and ISO 13655:2017

The assessment and viewing of printed products is carried out in accordance with specific standardized requirements. Colour matching light, for instance, is defined as D50 with an illuminance of 2000 lux ± 500 lux. The UV component of the colour matching light is strictly specified in ISO 3664:2009 with the result that the ambient light is closely aligned with the new measuring conditions M1 according to ISO 13655:2009.
In the same standard, the measurement device settings as, e.g., the M1 measurement mode, gloss-free measurement under 0°:45 or 45°:0°, the 2° standard observer or the matte white substrate for proof measurement and/or matte black substrate for print run measurements are also precisely defined.

ICC profile according to ISO 12647-2:2013

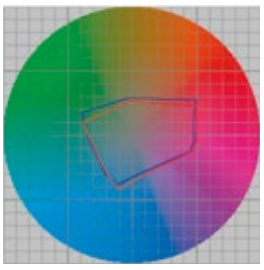
Taking the new paper classification and measurement conditions as a basis, new characterization data for sheetfed offset printing were defined for specific papers within the scope of the standard printing conditions. For printing condition 1 (coated paper) and printing condition 5 (uncoated paper) with measurement condition M1, the following characterization data are applicable:

- FOGRA 51 – Sheetfed offset printing condition 1 / Paper class 1
- FOGRA 52 – Sheetfed offset condition 5 / Paper class 5

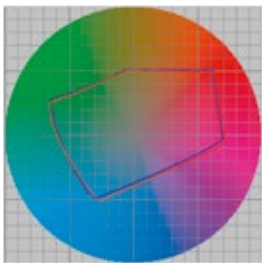
These concrete characterization data were used by FOGRA in cooperation with the ECI in order to define the new ICC profiles for sheetfed offset printing:

ISOcoated_v2.icc ↓ PSOcoated_v3.icc	FOGRA 39 ↓ FOGRA 51	ISO 12647-2:2009 ↓ ISO 12647-2:2013
ISOuncoated_v2.icc ↓ PSOuncoated_v3.icc	FOGRA 47 ↓ FOGRA 52	ISO 12647-2:2009 ↓ ISO 12647-2:2013

Lab-colorspace L = 50 presentation of a and b



PSOuncoated_v3.icc (red) and ISOuncoated_v2.icc (blue)



PSOcoated_v3.icc (red) and ISOcoated_v2.icc (blue)

Further innovations, above all for proofs and for printing, will be explained in the next article of the Printers` Guide.

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