

Printers' Guide

Standards in offset printing – an overview and updates II

Some of the changes and new requirements in the ISO 12647-2:2013 for sheet-fed offset printing have already been explained in the previous issue of the Printers' Guide. Important aspects were the new measurement conditions M0, M1, M2 and M3 defined in ISO 13655:2017 as well as, e.g., the new characterization data FOGRA 51 and 52, including the associated profiles PS0coated_v3.icc and PS0uncoated_v3.icc, respectively. Furthermore,

the degree of brightening of the papers is of great importance especially for the standardized printing conditions.

Paper classes

The ISO standard/PSO describes standard conditions in industrial mass production. Therefore, it is not possible to integrate all types and sorts of paper and/or to describe the corresponding printing conditions

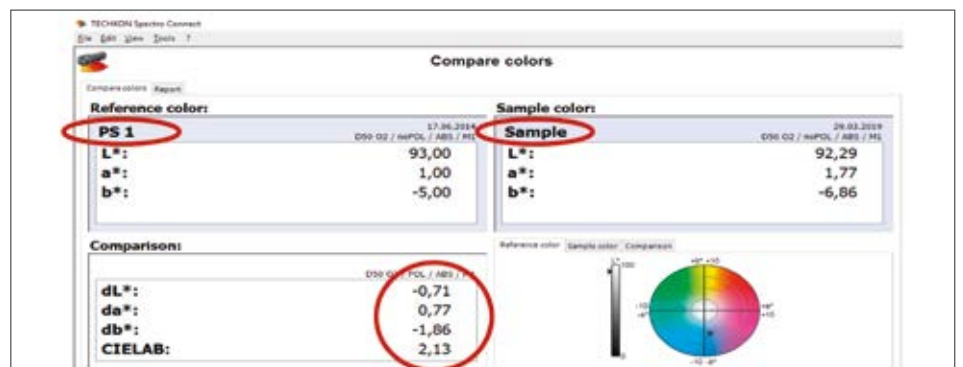
in a predictable manner. In the latest version of the ISO 12647-2, a re-classification of the paper types has been made. Now, two typical printing substrates for sheet-fed offset printing are defined. They are premium coated paper in Type 1 and uncoated yellowish paper in Type 5. In Types 2 to 4 and 6 to 8, paper commonly used in web offset printing is described. All substrates are defined together with the corresponding informative CIE-Lab* aim values. (See table)

	PS 1	PS 2	PS 3	PS 4
Surface	premium coated	improved coated	standard coated glossy	standard coated matte
Technology	sheet fed, web offset (heatset)	web offset (heatset)	web offset (heatset)	web offset (heatset)
Papers	wood-free coated (WFC), high weight coated (HWC), medium weight coated (MWC), glossy/semi-matte/matte	medium weight coated (MWC), light weight coated (LWC improved)	light weight coated (LWC), glossy/semi-matte	machine finished coated (MFC), light weight coated (LWC), semi-matte
Solid tint L*/a*/b* (BB) Tolerance	93 / 1 / -5 ±3 / ±2 / ±4	90 / 0 / -2 ±3 / ±2 / ±2	87 / 0 / 0 ±3 / ±2 / ±2	88 / 0 / -1 ±3 / ±2 / ±2

	PS 5	PS 6	PS 7	PS 8
Surface	wood-free uncoated	super calendered, uncoated	improved uncoated	standard uncoated
Technology	sheet fed, web offset heatset)	web offset (heatset)	web offset (heatset)	web offset (heatset)
Papers	wood-free uncoated (WFU)	super-calender (SC)	uncoated mechanical improved (UMI), improved newsprint (INP)	Standard newsprint (SNP)
Solid tint L*/a*/b* (BB) Tolerance	92 / 1 / -5 ±3 / ±2 / ±2	87 / 0 / 2 ±3 / ±2 / ±2	86 / -1 / 2 ±3 / ±2 / ±2	82 / 0 / 3 ±3 / ±2 / ±2

The spectral color measurement conditions are in conformance with the revised ISO 13655:2017.

For use in practice this means that the first step to standardized production is the selection of a type of paper that complies with the standard. There are several software solutions for an "Iso Check" to determine conformity with standards; alternatively it is possible to determine the CIE Lab* values by means of a commonly used spectrophotometer and to calculate the color distance according to Delta Eab.



Paperwhite check with the "SpectroConnect" software from Technon

Printing conditions

In line with the new paper types, 18 printing conditions have been defined which now form the basis of standardized printing. A total of 16 new printing conditions are included for sheet-fed offset printing, heatset and narrow-web offset printing. In addition, two printing conditions were added for coldset web offset printing from the ISO 12647-3; one of them is, however, only informative and thus described as not conformant to the standard. The printing conditions 1 and 5 are considered to be most important for offset printing. For these printing conditions, new characterization data with the corresponding profiles were already defined in the ISO 12647-2 using measurement mode M1. Another focus of the printing conditions is on the screening settings and the technical print parameters as, e.g., the tone value increase (TVI). For printing companies that seek certification according to ISO standards or just use the values as targets, it is mandatory to adjust all their parameters to the standard printing conditions. Otherwise there is no guarantee that the defined aim values and/or the desired quality is achieved with the profiles, the print characteristic curve or the proof target used.

Standard printing condition 1

- for all offset printing methods, excl. coldset web offset printing
- printing inks according to ISO 2846-1 (K-C-M-Y)
- paper Type 1 (premium coated, 80–250 g/m²)
- 60–80 l/cm screen (no conventional plate copying)
- characterization data: FOGRA 51 (M1)
- print characteristic curve / TVI according to ISO 12647-2:2013-A (16% mid-tone)

Standard condition 5

- for all offset printing methods, excl. coldset web offset printing
- printing inks according to ISO 2846-1 (K-C-M-Y)
- paper Type 5 (uncoated, wood-free, white, 70–250 g/m²)
- 52–70 l/cm screen (no conventional plate copying)
- characterization data: FOGRA 52 (M1)
- print characteristic curve / TVI according to ISO 12647-2:2013-C (22% mid-tone)

Digital proof

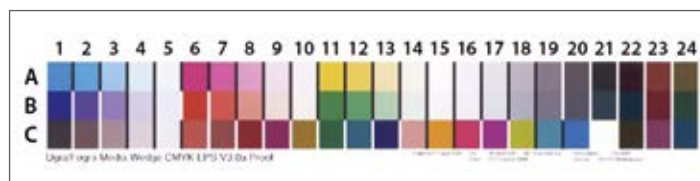
The effect that the light source used for measurement and/or the paper type has on the quality of the print product had already been described comprehensively. However, in order to adjust proof print production to the new printing parameters as well, further new criteria for standardized proof print production were defined in the ISO 12647-7:2016.

- In order to adjust the proof print substrate to the print production substrate, the chromaticity coordinates of the proof print substrate in the paper white simulation in measurement mode M1 must not be more than $\Delta E^*00=3,0$. To ensure that, the degree of brightening of the proof print substrate must comply with that of the production paper. The gloss properties were redefined as well; they must also be adjusted now.
- The assessment of the color distance between the aim value and the actual value of the color in proof printing is no longer based on the Euclidian formula ΔE^*76 , but on the non-Euclidian formula ΔE^*00 . This formula is much more complex, but better adjusted to the human color perception. In the previous formula, the color distances were purely formally shown as equidistant, whereas the distances were visually not perceived as equidistant. Therefore, the new standard ISO 12647-7:2016 requires the color proof to be calculated using the formula ΔE^*00 which compensates this fault. The formula name must also be precisely indicated in the measurement report and/or the test label.

- It is recommended to use measurement condition M1 in the metrological check of the proof print. In any case, the measurement condition should be suitable for the corresponding characterization data. So, if proof printing is carried out, e.g., in accordance with FOGRA 51 with the profile PS0coated_v3, measurement mode M1 must be used. If, however, an old print sample and/or old print data or standard printing condition 8 for which there are no new characterization data available is used, then measurement mode M0 must be chosen.
- For the evaluation of the Fogra MediaWedge 3.0 CMYK, new tolerances have been defined which are approximately the same as the quality of the old tolerances.

Paper white	patch C21	$\Delta E^*00 \leq 3,0$
Overall coloring, mean value	all patches	$\Delta E^*00 \leq 2,5$
Overall coloring, max. value	all patches	$\Delta E^*00 \leq 5,0$
Primary color solids	A1, A6, A11, A21	$\Delta E^*00 \leq 3,0$
Chromaticity grey, mean value	B16 – B21	$\Delta Ch \leq 2,0$
Chromaticity grey, max. value	B16 – B21	$\Delta Ch \leq 3,5$

- Definitions have been included for new, more precise and partly extended mandatory details to be given on a standardized contract color proof. They are, e.g.: Information regarding the proof standard used, including year specification, file name, name of the proof printing system, name of the proof printing substrate, the concrete reference printing condition, the measurement mode used as well as the date and time of proof print production. In addition, recommendations for further details as, e.g., regarding name of the printing inks or the RIP software used have been included.



Besides the changes, which are all based on the changes of the lighting conditions, all other processes based on the now no longer prevailing film-based printing plate production were removed. This means that all printing parameters, as, e.g., the print characteristic curve, are exclusively based on digital and linearized CTP printing plates.

In addition, the ISO standards 15397 and 14861 which are also of importance in offset printing were re-edited in recent years. In ISO 15397, all properties of paper substrates which need to be communicated by the paper manufacturers for the creation of a well-functioning color management workflow between proof printing and the print run are specified now. The new requirements for color soft proofing systems are defined in ISO 14861.

Now that many new developments in prepress and job preparation have been described, new developments and their effects on the printing sector will be explained in the next Printers' Guide.

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