INTERNATIONAL
PRINECT USER DAYS

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Workshop 33

Further development of ISO 12647-2:2013

Further development of ISO 12647-2:2013 …Something might finally be happening

International Prinect User Days 2015

Bernd Utter| Heidelberg, 19. November 2015

HEIDELBERG

Agenda

1. Which standards have been changed?
2. The meaning of the standards in particular
3. Switching to ISO 12647-2:2013
4. How to identify the right color at the printing press?
5. Proofing
6. The new ICC profiles
7. New preconditions

Which standards have been changed?

ISO 3664:2009
Describes the viewing conditions, also named standard light, as it is used in special viewing boothes in prepress or at the printing press‘ operation consoles.

ISO 5-3:2009
Describes the density measurement and fixes the worldwide standards for the names and measuring conditions.

ISO 13655:2009
Pre requisites for the spectral measurement of print products.

ISO 12647-2:2013
Delivers the parameters and references for the process control in sheetfed offset printing.

ISO 12647-7:2013
Defines the manufacturing and assessment of digital proofs. Technically identical with ISO 12647-2:2007. Is currently be revised.

Color viewing conditions

Previous version: ISO 3664:2000

→ Mainly UV-free illuminant
→ No stimulation of OBA in the printing paper
→ Prinect CP2000 Center, Prinect Press Center until mid of 2010

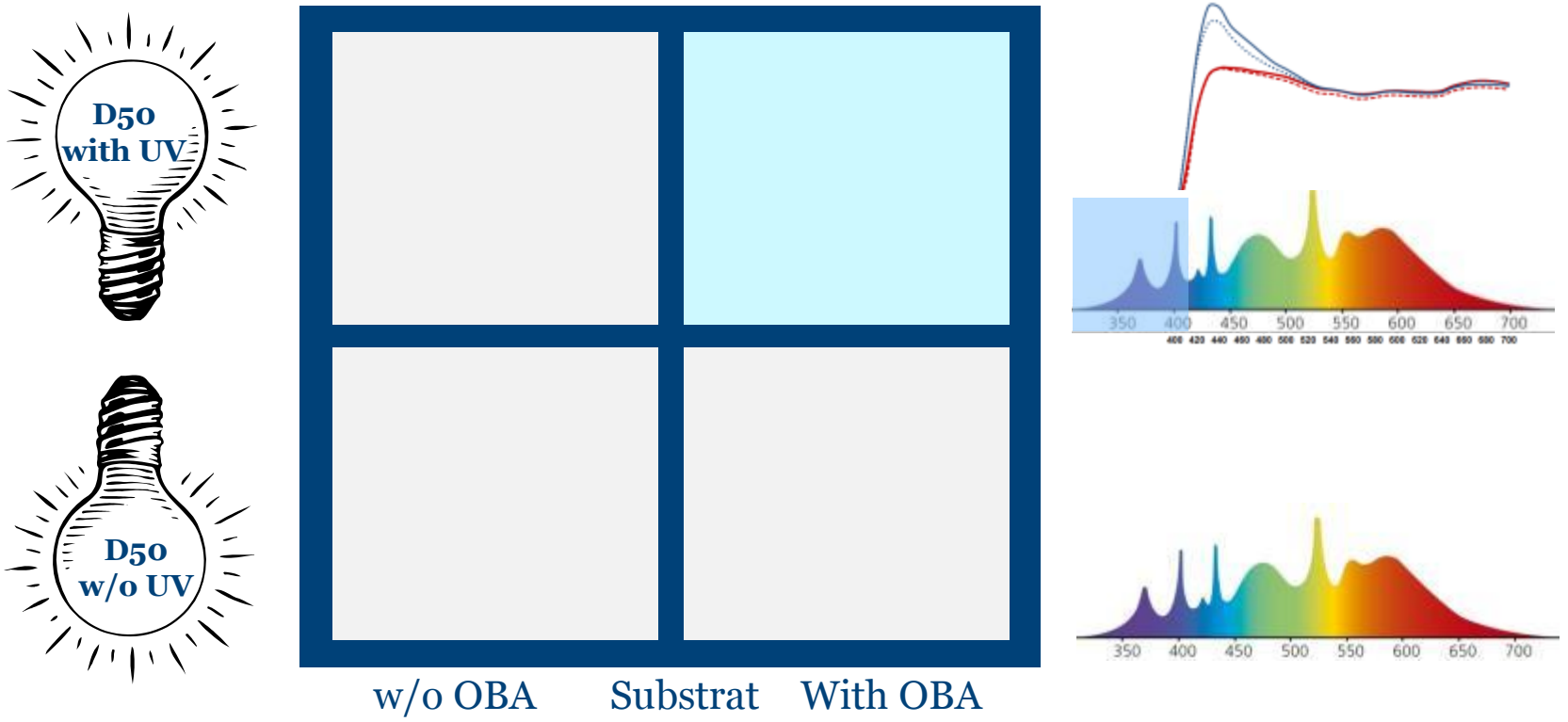
Actual version: ISO 3664:2009

→ Illuminant with defined UV part
→ Printing paper with OBA appears bluish or rather more neutral, proof without OBA more yellowish
→ Prinect Press Center since mid of 2010

Problems in the past

→ Different UV-proportion, depending on the provider/manufacturer, partly less than 100% (Just), partly more (Heidelberg)
→ Meanwhile unified UV component anywhere by 100% of specification

Color viewing conditions



Color viewing conditions

Problems with the actual light according to ISO 3664:2009

Proof on OBA free paper does not match the print when there paper is used, the brighteners are excited by the UV light and let the paper appear bluish.

Why are created proofs on OBA-free paper?

This recommendation originates from the time when OBA containing proofing papers were not color-stable and therefore not corresponding with ISO 12647-7 Proof.

Solution:

Act conforming to standards and use proofing paper with identical L*a*b* values, or similar share of OBA as the printing paper.
For example, Saphira Proofing Paper Satin 200/6.
The majority of commercial printing papers ranging from CIEb* -6. Therefore, the use of such a proofing paper is advisable.

Density measurement

Description of the new density filters

→ ISO 5-3 Status E

→ ISO 5-3 Status I

→ ISO 5-3 Status T

Description of the old density filters

→ DIN 16536

→ DIN 16536 NB (narrow band)

→ Ansi Status T

Heidelberg Recommendation:

→ Status E for all ISO-compliant measurements

→ Status I for special applications

→ Status T for measurements according to US standards

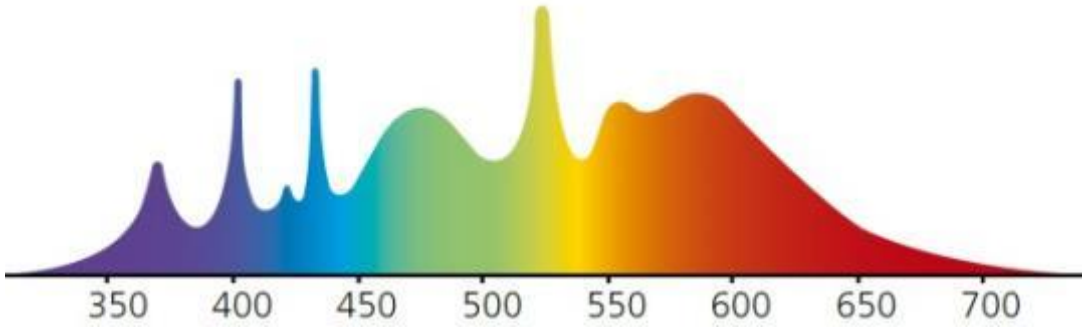
Spectral measurement

Previous version: ISO 13655:1996
Illuminant A with adaptation to D50,
UV proportion not defined, non-polarized

Actual version: ISO 13655:2009
M0 = Illuminant A approximately D50 with a non-defined proportion of UV
M1 = D50 with a defined proportion of UV
M2 = UV free illuminant
M3 = M2 + polarization filter

All instruments with M1 use a light sources with UV-containing illuminants.

This corresponds to the D50 much better with the requirements of an illumination with 5,000 K.



Spectral measurement

Since years D50 (color temperature 5.000 K) is the direction for a normative measurement according to ISO 12647-2.

Before:
Tungsten lamps don’t have D50, UV was not defined.
D50 was artificially created by calibrations,
a “real” D50 did not exist.
Optical brightening agents were captured differently.

As a result:
At the color measurement systems used to control printing presses the UV radiation is consequently cut-off. So this corresponds with illuminants M2 or M3.

Today:
M1 defines the part of UV in the light source to stimulate the OBA.
M1 is the preferred type of light for measurement of paper, dry inks and proofs according to ISO 12647-2: 2013.

At the press M2 and M3 is the preferred illuminant

The spectrophotometers connected to a printing press are mainly designed to control the inking (ink key settings).

The primary aims are:

→ Quick reach of the desired inking during make ready.

→ Avoiding deviations during print production by regular measurements.

The printer measures mainly wet print sheets. Based on this information he controls the ink keys of the press. M1 without a polarization filter would be useless, because

→ The characteristics (OBA) of the paper are not controllable
→ OBA will influence the follow-up negatively
→ The gloss of the wet ink wouldn‘t be eliminated

Process control in sheetfed offset printing ISO 12647-2:2013

What are the essential differences?

L*a*b* values for paper and coloring were adapted to actual printing conditions. Optical brightening agents (OBA) lead to a more bluish paper color. To be recognized by the CIEb* value. The more negative it is, the more blue is the paper.
The CIEL*a*b* value for coated paper in PC1 was changed from 95.0 0.0 -2.0 to now 95.0 1.5 -4.0

Tone value increase (TVI) is identical now for all 4 colors C, M, Y and K. The integer value moved from the 40% field (with 13% TVI) to the 50% field and is now determined with 16% TVI.

FM-screening defined at 20 – 30 µm.

Illuminant M1 for dry print sheets and proofs, thus take these measurements non-polarized under consideration of optical brighteners.

ΔE_{00} informative included, ΔE_{ab} furthermore normative!

How does the transition work?

Transition phase

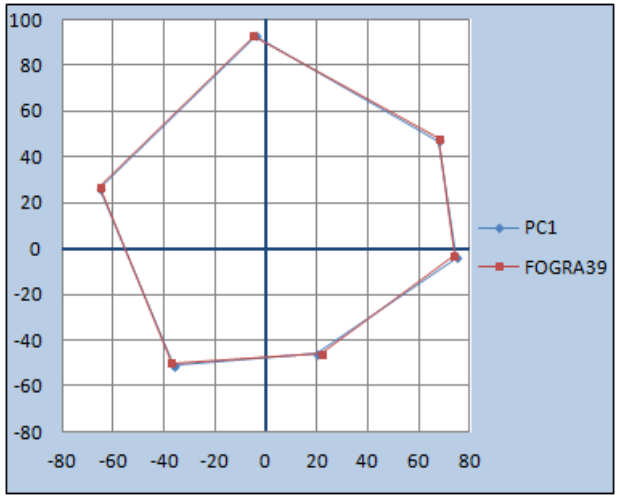
The transition from old to new ISO standard has already begun. But there is a transition process by printing companies have the opportunity to continue to print the old standard or introduce mixed mode until the new standard can be applied to all printed matter.

Since summer 2014 Heidelberg is implementing the new standard. The adaptation of TVI did not occur any problem. For proofing the profiles "HD_coated_2014" or "ISO_coated_v2" were either employed.

The comparison between the old and new target values in the print shows the marginal deviations of the color locations:

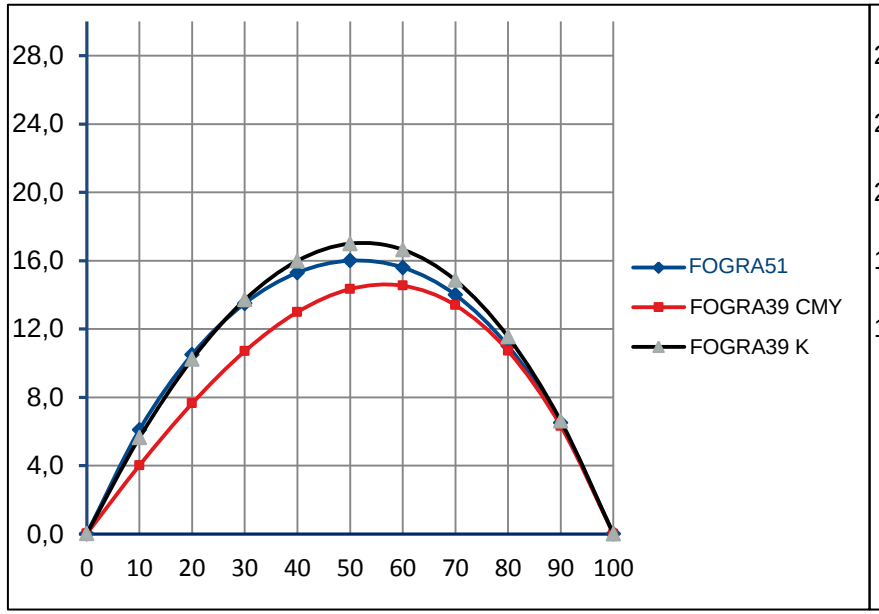
PC1 Premium coated			
	L*	a*	b*
Paper	95,0	1,0	-4,0
Cyan	56,0	-36,0	-51,0
Magenta	48,0	75,0	-4,0
Yellow	89,0	-4,0	93,0
Black	16,0	0,0	0,0
Red	48,0	68,0	47,0
Green	50,0	-65,0	26,0
Blue	25,0	20,0	-46,0
C+M+Y	23,0	0,0	-1,0

FOGRA39			
	L*	a*	b*
Paper	95,0	0,0	-2,0
Cyan	55,0	-37,0	-50,0
Magenta	48,0	74,0	-3,0
Yellow	89,0	-5,0	93,0
Black	16,0	0,0	0,0
Red	47,0	68,0	48,0
Green	50,0	-65,0	27,0
Blue	24,0	22,0	-46,0
C+M+Y	23,0	0,0	0,0



New dot gain curves (TVI)

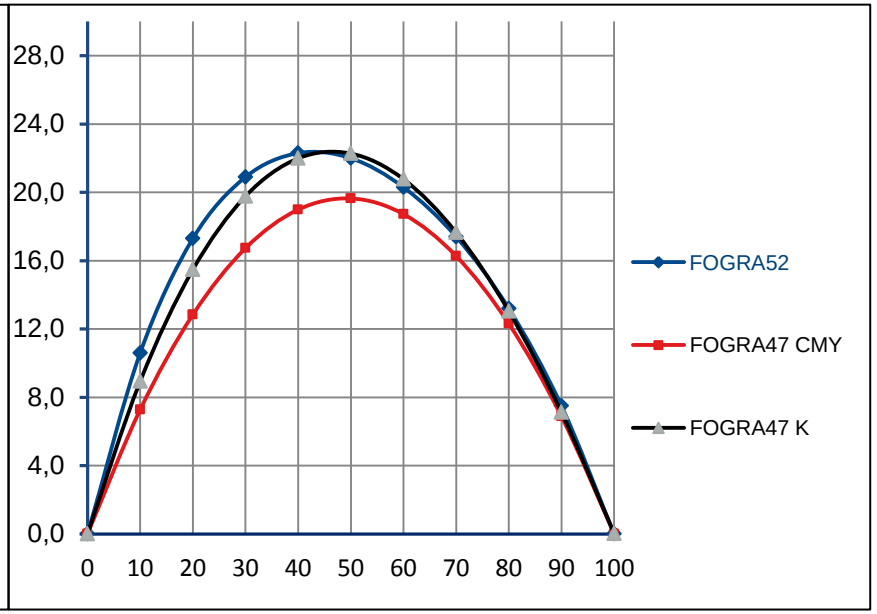
Comparison FOGRA51 and FOGRA39



FOGRA39: 13% TVI at 40% for CMY, 16% for K

FOGRA51: 16% TVI at 50% for CMYK

Comparison FOGRA52 and FOGRA47



FOGRA47: 19% TVI at 40% for CMY, 22% for K

FOGRA52: 22% TVI at 50% for CMYK

How to identify the right color at the printing press?

1. Keeping the existing ISO values will in most cases lead to the right result anyway.

2. Papers meeting old ISO in M0 will mostly meet the new ISO measuring with M1.

3. Starting from the scratch means:
   1. Printing a sheet until the ISO values are reached.
   2. Increasing the inking step by step (+10%).
   3. Identify which inking gives the best result after drying and measurement with M1.
   4. Feeding the press and the connected color measurement system with the corresponding wet values

Heidelberg delivers PC1 values for M0, M2 and M3 which nearly meet the M1 aim of ISO 12647-2:2013. These values were taken from original prints and averaged.

White B	Primary/Secondary/PW ISO 12647-2:2013 WB				
Measuring Mode	M1	M0	M1	M2	M3
	ISO				
C	*56/-36/-51*	55/-37/-50	55/-37/-50	55/-38/-49	53/-38/-49
M	*48/ 75/ -4*	48/ 74/ -2	48/ 74/ -4	48/ 73/ 0	46/ 74/ 0
Y	*89/ -4/ 93*	88/ -4/ 93	88/ -4/ 93	88/ -4/ 95	86/ -4/ 95
K	*16/ 0/ 0*	17/ 0/ 0	17/ 0/ 0	17/ 0/ 0	10/ 0/ 3
R	*48/ 68/ 47*	48/ 66 / 46	49/ 66/ 46	48/ 66/ 48	47/ 67/ 49
G	*50/-65/ 26*	49/-63/ 23	49/-64/ 23	49/-64/ 24	47/-65/ 23
B	*25/ 20/-46*	27/ 15/-44	27/ 16/-45	27/ 15/-44	24/ 15/-46
PW	*95/ 1/ -4*	95/ 1/ -3	95/ 1/ -5	95/ 0/ 1	93/ 0/ 0

Black B	Primary/Secondary/PW ISO 12647-2:2013 BB				
Measuring Mode	M1	M0	M1	M2	M3
	ISO				
C	*55/-35/-51*	55/-36/-49	55/-36/-50	54/-37/-49	53/-37/-49
M	*47/ 73/ -4*	47/ 72/ -3	47/ 72/ -5	47/ 72/ -1	45/ 73/ -2
Y	*87/ -4/ 91*	86/ -5/ 92	86/ -5/ 91	86/ -5/ 93	85/ -5/ 93
K	*16/ 0/ 0*	17/ -1/ 0	16/ -1/ 0	17/ -1/ 1	10/ 0/ 3
R	*46/ 67/ 45*	48/ 64 / 45	48/ 64/ 45	48/ 64/ 46	46/ 66/ 47
G	*49/-63/ 25*	49/-62/ 23	49/-63/ 22	49/-63/ 23	47/-65/ 23
B	*24/ 20/-45*	26/ 15/-44	27/ 16/-45	26/ 15/-44	24/ 15/-46
PW	*93/ 1/ -5*	93/ 1/ -4	93/ 1/ -6	93/ -1/ 0	91/ -1/ -1

Proofing according to standard ISO 12647-7:2013

Specifications of the actual ISO standard, original text

The digital proofing substrate should, if possible, be the same as the substrate to be used for production printing. Where this is not possible, the digital proofing substrate should have the same gloss and CIELAB a* and b* values as the intended production printing substrate within the tolerances … Where the characteristics of the printing substrate to be used for production printing are not exactly known, a suitable proofing substrate conforming to one of the three types … shall be used.

The proof and production printing substrates should ideally have similar UV responses under the recommended measurement conditions.

Practical implications

Use a proofing paper that is close to the print production paper.

Real workflow up to now

It is tried to simulate an offset print result by using OBA-free proofing paper and the use of the FOGRA39 characterization data, respectively profile ISOcoated_v2.icc.

Works: If either the viewing light of proof and print or the printing paper do not contain OBA.

Does not work: When comparing print on OBA paper and proof under natural daylight. Reason for frequent customer claims!

Therefore it is better now

FOGRA51

The characterization data are matched to the common printing papers used in commercial image printing. The CIEL*a*b* values are: L*= 95; a*= 1,5; b*= -6. These values are the basis for the new profile PSOcoated_v3.icc.
In contrast the profile HD_coated_2014.icc matches exactly the values given in ISO 12647-2:2013. L* = 95, a* = 1, b* = -4.

Practical implications

Using OBA-containing proof paper and the above Profiles the usual UV excitation of the printing paper is already taken into account during the proofing for printing on coated paper. This ensures that the comparability of print and proof works better both in the light booth, as well as at the press control station and in daylight.

Rendering Intent

When using the new profile on proofing paper with identical color values it can be proofed relative colorimetric. A paper white simulation is not necessary but advisable.
When using the profile HD_coated_2014 with the proofing paper mentioned above the proofing should be performed absolute colorimetric.

Functioning with uncoated paper

FOGRA52

These characterization data are also adapted in a practical manner to the mostly used, strongly brightened, uncoated offset papers with a CIEb* value of -10. FOGRA52 is the basis for the profile PSOuncoated_v3.icc.

Since the scattering ranges in uncoated printing papers, from the yellowish book paper to the extremely bluish offset paper, the characterization data of the profile HD_uncoated_2014.icc contain exactly the values of ISO 12647-2:-2013. This profile is rather a guide.

For an exact simulation of the production run far outside the specifications of PSOuncoated_v3.icc or HD_uncoated_2014.icc, custom profiles must be created. For this purpose a test form is to be printed to capture the values and spectral information meant to feed the Prinect Color Toolbox to create an ICC profile, which is then used to simulate the print at the proofer.

This procedure corresponds to Annex A of ISO 12647-2: 2013, which governs individual printing conditions and permits.

New ICC and Device Link Profiles

New ICC Profiles
The new ICC profiles **PSO_coated_v3.icc** and **PSO_uncoated_v3.icc** are offered for free as usual on **www.eci.org**.

From old to new and vice versa
Likewise, corresponding Device Link profiles are offered from the ECI for the conversion of FOGRA39 to FOGRA51 and vice versa.

These profiles can be installed in the Prepress Manager, so that the color space conversion is performed on the fly.

European Color Initiative

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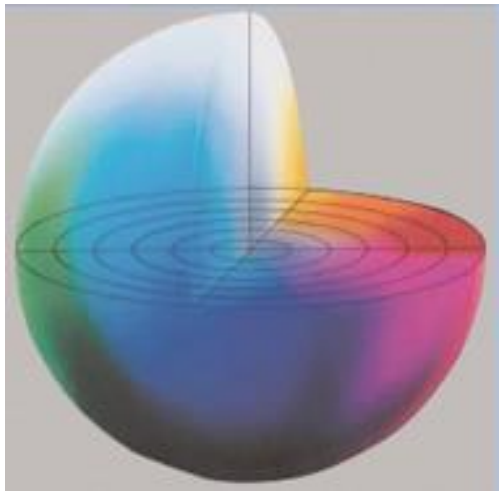

Requirements for print shops

Proofing Paper

When the process according to FOGRA39 should be replaced by FOGRA51, then only the former OBA-free proofing paper has to be replaced by proofing paper with the new specifications. For example, Saphira Proofing Paper Satin 200/6.
Another proofing paper is possibly required for special applications and uncoated papers (as previously).

Colorimeters

For the standardized measurement of proofs and dry printed sheets a spectrophotometer with illuminant M1 is required.
The Epson SpectroProofer can be converted from ILS 20 to ILS 30 (M1).
For color control on printing machines and for measuring the TVI in wet sheets the existing color measurement systems with the illuminants M2 and M3 are more ideal. Also M0 device can still be used.

Process Calibration

The process calibration in CtP must be adapted to the new standard TVI accordingly. For an optimal implementation we recommend our service Print Color Management.

Viewing Light

Unless already done, the light must be convert to standard ISO 3664:2009. Attention should be paid to single tubes with identical possible UV component.

Thank you for your attention
Heidelberger Druckmaschinen AG