

## L\*a\*b\* values of process inks for commercial printing

When it comes to colour management, one question that crops up again and again relates to the correct L\*a\*b\* values of the process colours. These values have been defined and described in the international standards DIN ISO 12 647 and DIN ISO 2846.

### DIN ISO 2846

DIN ISO 2846 Parts 1 and 2 define the process colours for the four-colour offset process. DIN ISO 2846-1 specifies the colour values for sheet-fed offset and web-offset heatset inks and DIN ISO 2846-2 specifies the colour values for web-offset newspaper inks, which must be obtained under defined conditions using a printability tester and on specific test stock. These two standards therefore form the basis upon which printing ink manufacturers work, but actually relate solely to proofing in the laboratory.

### Colorimetric values per DIN ISO 2846-1 (standard illuminant D50, standard observer 2°)

Ink	CIELAB-value			tolerance $\Delta E$ ab*
	L*	a*	b*	
Yellow	91,0	-5,1	95,0	4,0
Magenta	50,0	76,0	-3,0	4,0
Cyan	57,0	-39,2	-46,0	4,0
Black	18,0	0,8	0,0	*

tolerance for Black L\* <18, a\* +/- 1,5, b\* +/- 3,0

### DIN ISO 12 647

DIN ISO 12 647-2 (sheet-fed offset and web-offset heatset) and DIN ISO 12 647-3 (web-offset newsprinting) define the parameters and the test methods and conditions required for proofing and the production run. Accordingly, these standards contain not only the colour values to be aimed for on 5 different classes of substrates but also specifications regarding inking of the stocks, dot gain, screen ruling and other parameters. The colour values on the 5 standardised stocks are obtained by making printshop prints with inks that conform to DIN ISO 2846.

#### COMMENT

The data listed below refer to the amended ISO/CD 12 647-2 values .

## Black backing

Paper grade	L <sup>1</sup>	a <sup>1</sup>	b <sup>1</sup>	Gloss	Grammage g/m <sup>2</sup>
1. glossy coated wood-free	93	0	-3	65	115
2. matt coated wood-free	93	0	-3	38	115
3. glossy LWC +	89	0	-1	55	65
4. uncoated white	92	0	-3	6	115
5. uncoated yellowish	94	-0,6	2,3	6	115
Tolerance	±3	±2	±2	±5	

<sup>1</sup> Specifies values per ISO/CD 12 647 - 2: D50, 2°, 0/45 or 45/0

## White backing

Paper grade	L <sup>1</sup>	a <sup>1</sup>	b <sup>1</sup>	Gloss	Grammage g/m <sup>2</sup>
1. glossy coated wood-free	95	0	-2	65	115
2. matt coated wood-free	95	0	-2	38	115
3. glossy LWC +	92	0	-2	55	65
4. uncoated white	95	0	-2	6	115
5. uncoated yellowish	95,9	-0,8	3,9	6	115
Tolerance	±3	±2	±2	±5	

<sup>1</sup> Specifies values per ISO/CD 12 647 - 2: D50, 2°, 0/45 or 45/0

Inks in accordance with DIN ISO 2846 produced, under printshop conditions, the following CIELAB coordinates (colour sequence: cyan, magenta, yellow) on the stocks stipulated:

## L\*a\*b\* values

Papiertyp	1+2			3			4			5		
	L*	a*	b*	L*	a*	b*	L*	a*	b*	L*	a*	b*
<b>black backing</b>												
Black	16	0	0	19	1	2	31	1	1	29,3	1,7	1,9
Cyan	54	-36	-49	56	-36	-45	58	-25	-43	56,9	-24,9	-40,6
Magenta	46	72	-5	46	70	-7	54	58	-2	52,1	58,5	3,7
Yellow	87	-6	90	84	-4	86	86	-4	75	87,4	-0,8	78
Red (M+Y)	46	67	47	46	62	42	52	53	25	50,1	54,7	28,9
Green (C+Y)	49	-63	26	49	-57	26	53	-42	13	49,7	-37,9	15,8
Blue (C+M)	24	21	-45	27	16	-45	37	8	-30	37	8,1	-22,1
Cyan (M+Y)	22	0	0	27	-4	-1	32	0	0	34,5	-0,7	0,1
<b>withe backing</b>												
Black	16	0	0	20	1	2	31	1	1	29,4	1,8	2,1
Cyan	55	-37	-50	57	-37	-46	60	-26	-44	58	-25,7	-40,2
Magenta	48	74	-3	48	73	-6	56	61	-1	53	59,9	4,5
Yellow	89	-5	93	86	-2	89	89	-4	78	89,2	-1	80,5
Red (M+Y)	47	68	48	48	66	44	54	55	26	51	56	30,1
Green (C+Y)	50	-65	27	50	-59	26	54	-44	14	50,6	-39,1	16,8
Blue (C+M)	24	22	-46	28	16	-46	38	8	-31	37,5	8,3	-22,1
Cyan (M+Y)	23	0	0	27	-4	-2	33	0	0	34,9	-0,8	0,4

<sup>1</sup> Specifies values per ISO/CD 12 647 - 2: D50, 2°, 0/45 or 45/0

## Cielab-ΔE tolerances for the primary colour solids

	Black	Cyan	Magenta	Gelb
Variation	5,0 dE 2,5 dH	5,0 dE 2,5 dH	5,0 dE 2,5 dH	5,0 dE 2,5 dH
Fluctuation	4,0 dE	4,0 dE	4,0 dE	5,0 dE

## Dot gain

Tonwert Film/ Daten	Tonwertzunahme					
	Akzidenz-Offsetdruck					NP - Raster
	A:13%	B:16%	C:19%	D:22%	E:25%	F:28%
0	0,0	0,0	0,0	0,0	0,0	0,0
5	2,0	3,0	3,9	4,8	5,7	6,7
10	4,0	5,6	7,3	8,9	10,6	12,3
15	5,9	8,1	10,3	12,5	14,7	17,0
20	7,6	10,2	12,8	15,5	18,1	20,8
25	9,3	12,1	15,0	17,9	20,8	23,8
30	10,7	13,7	16,7	19,8	22,8	25,9
35	12,0	15,0	18,1	21,1	24,2	27,3
40	13,0	16,0	19,0	22,0	25,0	28,0
45	13,8	16,7	19,5	22,4	25,2	28,0
50	14,3	17,0	19,6	22,3	24,9	27,5
55	14,6	17,0	19,4	21,7	24,1	26,4
60	14,5	16,6	18,7	20,8	22,8	24,8
65	14,1	15,9	17,7	19,4	21,1	22,7
70	13,4	14,9	16,3	17,6	19,0	20,3
75	12,3	13,4	14,5	15,5	16,5	17,5
80	10,7	11,5	12,3	13,0	13,7	14,4
85	8,7	9,3	9,8	10,2	10,7	11,0
90	6,3	6,6	6,9	7,1	7,3	7,5
95	3,4	3,5	3,6	3,7	3,8	3,8
100	0,0	0,0	0,0	0,0	0,0	0,0
PT 1 und PT 2	<input type="checkbox"/> CMY	<input type="checkbox"/> K	<input checked="" type="checkbox"/> CMY	<input checked="" type="checkbox"/> K		<input type="checkbox"/> CMYK/NP
PT 3		<input type="checkbox"/> CMY	<input type="checkbox"/> K	<input checked="" type="checkbox"/> CMY	<input checked="" type="checkbox"/> K	
PT 4 und PT 5			<input type="checkbox"/> CMY	<input type="checkbox"/> K	<input checked="" type="checkbox"/> CMY	<input checked="" type="checkbox"/> K <input type="checkbox"/> CMYK/NP
PT 2 (Endlos)			<input type="checkbox"/> CMY	<input type="checkbox"/> K		
PT 4 (Endlos)				<input type="checkbox"/> CMY	<input type="checkbox"/> K	
SC-und MFC Papiere		<input type="checkbox"/> CMY	<input type="checkbox"/> K			
SNP - Papier			<input type="checkbox"/> CMY	<input type="checkbox"/> K		

Dot gain commercial offset printing (printing curve A to F over the full tonal range) according to ISO 12647-2. Reference: 40% of the control panel. Dot gain for non-periodic pattern (NP) 28% (CMYK).

PT = paper type,  = positive copy,  = negative copy (Film)

## Criteria for selecting the good copies

Dot gain in 40 % mid-tone	±4 %
Dot gain in 80 % tone	±3 %
Scatter* in 40 % mid-tone	±5 %
Scatter* in 80 % mid-tone	±5 %
Solid tones per draft standard ISO 12 647-2	5 dE

\*Scatter: maximum difference in dot gain between C, M and Y

## What is the difference between DIN ISO 2846 and DIN ISO 12 647?

If you compare the colorimetric values, you notice that the values cited in DIN ISO 2846 and DIN ISO 12 647 are not the same. DIN ISO 2846 describes measurement of the colorimetric values of laboratory proofs on a defined test stock, while DIN ISO 12 647 defines the chromaticity points of printshop prints on different substrates. According to the standardisation, printing inks that are standardised per DIN ISO 2846-1 and 2 in the laboratory must automatically conform to DIN ISO 12 647-2 and -3 in the printshop print. This, however, is not always the case.

The main reason for this is that the ink system (with the right one for the job being used) is not the only factor that influences the actual production process but other parameters - such as the make, model and configuration of the press, the rubber blankets, substrate, fountain solution setting and the colour sequence - also affect the process and therefore the print result.

For this reason, the only option open to the manufacturers of printing inks is to issue their customers with a certificate confirming that specific ink series conform to DIN ISO 2846-1 or -2 but not to DIN ISO 12 647-2 or -3 because the conditions and parameters of relevance to the printing process differ greatly from printshop to printshop.

## Summary

The above mentioned standards open up new possibilities for standardisation of the offset process. To what extent customers can and are willing to use the stocks stipulated by this standard - an absolute must if the specifications are to be fulfilled - only the future will tell. Let's hope that the standardised offset process doesn't soon fall victim to the incessant pressures on costs, especially those relating to the prepress stages.

In principle, all ink series from the hubergroup's product portfolio comply with the specifications laid down in DIN ISO 2846-1.

### References, sources:

- [1] ISO 2846-1, issue 2007-03-30
- [2] ISO 12 647-2, issue 2007-2 AMD1
- [3] Medienstandard Druck 2010

---

Contact addresses for advice and further information can be found under [www.hubergroup.de](http://www.hubergroup.de)

This Technical information sheet reflects the current state of our knowledge. It is designed to inform and advise. We assume no liability for correctness. Modifications may be made in the interest of technical improvement.