

EXPERT OPINION No. 19299

8.9.2005

UB

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72072 Tübingen

Order date 2005-08-05

Description of task: Certification of proof paper

Submitted material:
1. GMG Proofpaper Gloss 260
2. GMG Proofpaper Semimatte 250
3. GMG Prooffilm Opaque

Investigator: Dr. Uwe Bertholdt

Enclosed material: Certificate

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1 *Printing substrate types:*

No.	name;	Paper type to be simulated	Format
1 a	Proofpaper Gloss	PT 1	A 3+
1 b	260	Flexo	
2 a	Proofpaper Semi-	PT 1	A 3+
2 b	matte 250	PT 2	
2 c		PT 3	
2 d		Gravure S 1	
3 a	Opaque Film	Flexo	A 3+

2 *Assessment standards*

- [1] Standard ISO 2470: 1999
Paper, board and pulp – Measurement of blue reflection factor (ISO brightness)
Beuth-Verlag, 10772 Berlin
- [2] Standard ISO 2469: 1998
Paper, board and pulp – Measurement of the diffuse reflection factor; Technical corrigendum 1
Beuth-Verlag, 10772 Berlin
- [3] Standard DIN ISO 13655: 2000
Graphische Technik - Spektrale Messung und farbmétrische Berechnung für graphische Objekte
Beuth-Verlag, 10772 Berlin
- [4] Dolezalek F.:
ProzessStandard Offsetdruck
bvdM/FOGRA, Wiesbaden/München, 2001 (incl. 2003 amendments)
- [5] N.N.
MedienStandard Druck 2004
Bundesverband Druck und Medien e.V., Wiesbaden, 2004
- [6] Dolezalek, F.:
Wie prüft man einen digitalen Prüfdruck auf Farbrichtigkeit?
[www.fogra.org / Services / Proof prints and proof printing systems](http://www.fogra.org/Services/Proof%20prints%20and%20proof%20printing%20systems)
- [7] Standard DIN EN ISO 8257-1:2003
Papier und Pappe - Bestimmung des Glanzes - Teil 1: Messung mit einem konvergierenden Strahl bei 75°, TAPPI-Verfahren
Beuth-Verlag, 10772 Berlin

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- [8] Standards ISO 12647
Druck- und Reproduktionstechnik - Prozeßkontrolle für die Herstellung von gerasterten Farbauszügen, Prüfdrucken sowie An- und Auflagendruckten
Beuth-Verlag, 10772 Berlin
- [9] Standard DIN EN ISO 105-B
Lichtechtheitstypen der Deutschen Echtheitskommission, Type 1 gemäß
Beuth-Verlag, 10772 Berlin

3 Coloration in accordance with ISO 12647

The coloration is to be checked in accordance with [8] in which the substrate differing from [3] is colorimetrically measured in accordance with [6] against a white backing (wb). The colour measurement is carried out with a Gretag Macbeth Spectroeye.

No.	Substrate			ISO-value			ΔL^*	Δa^*	Δb^*	Tolerance		Result
	(actual) wb			wb						ΔL^*	$\Delta a^*, \Delta b^*$	
	L^*	a^*	b^*	L^*	a^*	b^*				ΔL^*	$\Delta a^*, \Delta b^*$	
1. a	95.3	-0.3	-3.7	95	0	-2	0.3	-0.3	-1.7	3	2	OK
1. b	95.3	-0.3	-3.7	☐88	0	0	OK	-0.3	-3.7	-	3/5	OK
2. a	97.3	-0.7	-0.7	95	0	-2	2.3	-0.7	1.3	3	2	OK
2. b	97.3	-0.7	-0.7	94	0	-2	3.3	-0.7	1.3	3	2	OK*
2. c	97.3	-0.7	-0.7	92	0	5	5.3	-0.7	-5.7	3	2	OK*
2. d	97.3	-0.7	-0.7	☐91	0	-3	OK	-0.7	2.3	-	2	OK*
3	96.7	0.6	-3.9	☐88	0	0	OK	0.6	3.9	-	3/5	OK

Tab. 1: Colour of substrates compared to [5].

OK*: The paper falls outside the tolerance limits but it is brighter than the substrate being simulated. In such a case the coloration may be classed as acceptable, since the paper shade can be simulated by the proof printing system.

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4 Gloss in accordance with ISO 8254-1 (TAPPI)

The TAPPI gloss was measured for the submitted substrates in accordance with [7] using the Lehmann gloss measurement device system.

No.	Gloss in %	ISO-values Gloss in %	Paper type	Tolerance in %	Result
1. a	62.9	65	1	±10	OK
1. b	62.9	-	Flexo		OK
2. a	49.8	65	1	±10	Not OK
2. b	49.8	38	2	±10	Not OK
2. c	49.8	55	3	±10	OK
2. d	49.8	65	S 1	±10	Not OK
3.	69.2	-	Flexo		OK

Tab. 2: Gloss measurements and compliance in accordance with [4, 8].

5 ISO-Brightness in accordance with [1, 2]

This is determined over ten different measurement positions and in each case with ten layers. The following tables contain the measurement parameters and the readings for the measurements that were carried out.

Measurement parameter:	DataColor SF450: S.No. 1107
Measurement aperture	30 mm
UV calibration	UV-C (STFI Standard)
Gloss	Excluded

Tab. 3: Measurement conditions for ISO brightness measurement.

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No.	ISO brightness measurement	ISO- values	
1. a	91.2 %	89 %	OK
1. b	91.2 %	Not standardized	OK
2. a	92.1 %	89 %	OK
2. b	92.1 %	89 %	OK
2. c	92.1 %	70 %	OK
2. d	92.1 %	Not standardized	OK
3.	93.6 %	Not standardized	OK

Tab. 4: ISO brightness measurements.

6 Usability as white backing

The submitted substrates are checked in relation to [6] to see whether they fulfil the criteria for white backing. The opacity is quantified in accordance with [6] by the ratio of the CIE Y brightness references values on white and black backing $O = Y_{bb}/Y_{wb} \times 100\%$. The substrate is classed as opaque when $O = 99\%$. Several layers of the substrate are used to increase the opacity and Table 5 shows the number of layers required. The CIELAB chromaticity and reflection factor are determined on a white backing in accordance with [3]. It should be noted here that the minimum reflection factors in Table 6 correlate with a minimum CIE $L^* = 92$, so that this criterion is not listed separately (see Table 1).

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No.	No. layers	Opacity		DIELAB chromaticity C*		Result
		Actual	Lower limit	CIE C*	Upper limit	
1.	3	99.1 %	99 %	3.6	3	Not OK
2.	3	99.7 %	99 %	0.9	3	OK
3.	5	98.8 %	99 %	3.8	3	Not OK

Tab. 5: criteria for white backing I.

No.	Minimum reflection factor								Fluorescence		Result
	R400	R410	R420	R450	R460	R670	R680	R700	Actual	Target	
	>0.3	>0.3	>0.75	>0.75	>0.8	>0.8	>0.75	>0.75			
1.	0.73	0.79	0.89	0.95	0.94	0.91	0.92	0.93	yes	no	Not OK
2.	0.61	0.74	0.88	0.96	0.96	0.95	0.95	0.96	no	no	OK
3.	0.43	0.50	0.79	1.03	0.98	0.92	0.92	0.92	yes	no	Not OK

Tab. 6: criteria for the white backing II.

The presence of optical brighteners in the ink acceptance layer is visually checked using a UV lamp (Just Normlicht Pantone Color Viewing Light). In the event of a positive result, the papers are automatically placed in the “Yellow Pages” on the FOGRA home page [4].

7 Ageing resistance and light fastness

The light fastness of the proof paper is investigated by placing it in the sun tester (Atlas Suntest CPS) for 24 hours (Wool scale [9] = 3) with a window glass filter. This corresponds to about 300 days of illumination at average office lighting levels

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of 750 lx or 20 days of open air exposure in Germany. In addition, the papers are also subjected to a fluctuating climate test consisting of 24 hours exposure to 25°C and relative humidity of 25% followed by 24 hours at +40°C and 80% relative humidity. Then they are checked for ageing resistance. This is investigated after 7 days in a dry box at 40°C. This corresponds to an actual lifespan of 48 to 64 days. After the procedures described here have been carried out the substrate should not exceed a tolerance of $\Delta E^* = 1.5$.

Summary of ΔE^*_{ab} colour location shifts after exposure to						
No.	1. Light-fastness test	2. 25°C at 25% rh	3. 40°C at 80% rh	4. 7 days at 40°C	Tolerance	Result
1	0.4	0.7	0.5	0.5	1.5	OK
2	0.4	0.6	0.5	0.9	1.5	OK
3	0.9	0.6	1.4	1.3	1.5	OK

Tab. 7: Colour location shifts with ageing and irradiation.

8 Summary

The individual criteria and the corresponding test results are summarized in Table 8.

	Colour of paper	Gloss	ISO brightness	Ageing & Lightfastness
1.a	OK	OK	OK	OK
1. b	OK	OK	OK	OK
2.a	OK	Not OK	OK	OK
2.b	OK*	Not OK	OK	OK
2.c	OK*	OK	OK	OK
2.d	OK*	Not OK	OK	OK
3.	OK	OK	OK	OK

Tab. 8: Overview of the FOGRA proof paper guidelines and the tested papers.

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The papers were tested in relation to the FOGRA proof paper guidelines. Only paper 2 failed to fulfil the informative gloss criterion for paper types 1 and 2 for offset printing and gravure S1. All the other criteria were fulfilled. Paper 2 passed the additional test to determine whether it might be used as a white backing in accordance with [6].

Papers that have passed the certification procedures, should be submitted for recertification without a request having to be made in the event of changes to the paper recipe or the manufacturing conditions. Otherwise paper certificates run for a maximum of two years from the date of the expert opinion.

NB: colour measurements made with colour measurement devices in the graphic industry can result in different measurements due to the UV component of the lighting unit when measuring brightened papers.

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