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Order of: 2008-10
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Task: Proofing system certification
„ORIS Color Tuner“

Submitted material: FograCert test forms A3+

Report prepared by: Dipl.-Ing. C. Bickeböller,
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Documents enclosed: Certificates

1 Purpose

This certification report comprises the FograCert programme carried out with the proofing software „Oris Color Tuner“ in the below mentioned configurations. As of January 2007, the FograCert criteria are based on ISO 12647-7 [8].

	Prinrting condition	Software	Printer	Substrate
1	FOGRA39	ORIS Color Tuner	HP Z 3200	CGS PearlProof Super 240 g/m²
2	FOGRA39	ORIS Color Tuner	HP Z 3200	CGS PearlProof Super Glosy 240 g/m²
3	FOGRA39	ORIS Color Tuner	Epson 7900	CGS PearlProof Super 240 g/m²
4	FOGRA39	ORIS Color Tuner	Epson 7900	CGS PearlProof Super Glosy 240g/m²
5	FOGRA39	ORIS Color Tuner	Epson 7900	CGS PearlProof Select 210g/m²

Table 1: Tested configurations.

The certification was accomplished under the following climatic conditions. The average air temperature was 23°C and the relative humidity was 49%. The rooms were air-conditioned.

2 Literature

[1] Standard ISO 12647-2:2004 / Amd 1
Graphic technology – Process control for the production of half-tone colour separations, proof and production prints – Part 2: Offset processes
www.beuth.de

[2] Dolezalek, F.:
ProzessStandard Offsetdruck [PSO]
Wiesbaden: Bundesverband Druck und Medien e. V., 2001 and complement of May 2003
[German language only]

[3] N. N.:
Medien Standard Druck 2007
Wiesbaden: Bundesverband Druck und Medien e.V., 2007
www.bvdm.org

[4] N.N.: Altona Test Suite 1.2
www.eci.org

[5] Standard ISO 15930-6:2003
Graphic Technology – Prepress digital data exchange using PDF – Part 6: Complete exchange of printing data suitable for colour-managed workflows
www.beuth.de

[6] Standard ISO 13655:1996
Graphic Technology - Spectral measurements and colorimetric computation for graphic arts images
www.beuth.de

[7] Standard EN ISO 8257-1:2003
Paper and Board – Determination of Brightness – Part 1: Measurement with a 75° converging light beam TAPPI-Procedure
www.beuth.de

[8] ISO 12647-7:2007
Graphic technology – Process control for the manufacture of half-tone colour separations, proof and production prints – Part 7: Off-press proofing processes working directly from digital data
www.beuth.de

3 Evaluation

3.1 Setting up the proofing system

The set up procedure was done in accordance to the requirements of the supplier. Details of the set up procedure are documented in the annex.

3.2 FograCert Criteria

The FograCert criteria to be checked are the following:

- Proofing substrate colour and gloss
- Permanence and light fastness
- Colour accuracy [Gamut included]
- Drift of the solids CMYK and RGB
- Homogeneity
- Short- and long-term repeatability
- Rub resistance [drying]
- Tone value reproduction limits and reproduction of vignettes
- Image register and resolving power
- Margin information
- Tone value difference

At the vendors premise and for relative measurements only the proofs were measured with a XRite Eye-One Pro [Serial no. 3278-810153-5] on white backing. Unless otherwise specified all colorimetrical measurements have been derived by averaging five single spot measurements.

4 System configuration

Tables 2 to 4 describe the significant system parameters of the tested proofing system.

	Proof printer 1	Proof printer 2
Name	**HP Z3200**	**HP Z3200**
Plant number	**Q6660C**	**Q6660C**
Serial number	**MY79P0C01T**	**MY79P0C01T**
Printer type	**Inkjetdrucker**	**Inkjetdrucker**
Resolution	**600dpi**	**600dpi**
Proof printer driver	**k. A.**	**k. A.**
Management software [Client]	**ORIS Color Tuner**	**ORIS Color Tuner**
Release	**5.5**	**5.5**
Operating system	**Windows XP**	**Windows XP**
RIP [conversion PDF to TIFF]	**ORIS Rip**	**ORIS Rip**
RIP-Release		
RIP serial number	**k. A.**	**k. A.**
Printing direction	**bidirektional**	**bidirektional**

Table 2: System features 1/3.

Systemtypisierung	Proof printer 3	Proof printer 4
Name	Epson 7900	Epson 7900
Plant number	CA1200S	CA1200S
Serial number	220022	220022
Printer type	Inkjetdrucker	Inkjetdrucker
Resolution	720dpi	720dpi
Proof printer driver	k. A.	k. A.
Management software [Client]	ORIS Color Tuner	ORIS Color Tuner
Release	5.5	5.5
Operating system	Windows XP	Windows XP
RIP [conversion PDF to TIFF]	ORIS Rip	ORIS Rip
RIP-Release		
RIP serial number	k. A.	k. A.
Printing direction	bidirektional	bidirektional

Table 3: System features 2/3.

Systemtypisierung	Prüfdrucker 5
Prüfdrucker	Epson 7900
Modellnummer	CA1200S
Seriennummer	220022
Art des Prüfdrucksystems	Inkjetdrucker
Auflösung	720dpi
Treiber Prüfdrucker	k. A.
Ansteuerungs-Software	ORIS Color Tuner
Release	5.5
Betriebssystem	Windows XP
RIP [Konvertierung PDF nach TIFF]	ORIS Rip
RIP-Release	
RIP-Seriennummer	k. A.
Druckrichtung	bidirektional

Table 4: System features 3/3.

	Substrate 1	Substrate 2
Name	PearlProof Super	PearlProof Super Glossy
Paper mass	240 g/m²	240 g/m²

Table 5: Substrates 1/2.

	Substrate 3
Name	Pearl Select
Paper mass	210g/m²

Table 6: Substrates 2/2.

	Ink set 1	Ink set 2
Name	Epson UltraChrome ADR	HP Vivera Ink
used in	Epson 7900	HP Z 3200

Table 7: Inks.

5 Results

5.1 Proofing substrate colour and gloss

The various paper types were evaluated against TAPPI gloss [7] using a System Lehmann gloss measuring equipment. In addition the coloration was measured [6]. The aim values for gloss and substrate colour are given in Table 7. The gloss tolerances have been modified towards the classifications to be included in the next revision of ISO 12647-7.

Proof substrate type	L*	a*	b*[a]	Gloss
Unit	1	1	1	1
1: Glossy white	≥ 95	0	0	> 60
2: Semi-matte white	≥ 95	0	0	20 - 60
3: Matte white	≥ 95	0	0	< 20
Tolerance	-	± 2	± 2	-

Table 8: Aim values for gloss and colour of proofing substrates [8] – [a] informative only because of lack of inter-instrument agreement caused by different UV characteristics.

Table 8 depicts the gloss measurements on areas without paper simulation. Based on the classification in Table 7 [“Glossy”, “Semi-matte” and “Matte”] every digital proofing paper could be classified.

Proofing substrate	Gloss	Proofing Paper category
PearlProof Super 240 g/m²	63,5	Glänzend
PearlProof Super Glossy 240 g/m²	70,2	Glänzend
Pearl Select 210 g/m²	54,5	Semi-matt

Table 9: Gloss measurements; classification of the pertinent proofing papers.

The colour measurements of the unprinted substrates are shown in Table 9. Even though the tolerances have been exceeded the

coloration of the proofing substrate is in conformance with the specified values, since their informative character [8].

Substrate	L*	a*	b*	OK?
PearlProof Super 240 g/m²	95,4	-0,2	-1,2	O. K.
PearlProof Super Glossy 240 g/m²	95,4	-0,3	-1,3	O. K.
Pearl Select 210 g/m²	95,6	0,3	-2,4	O. K.

Table 10: CIELAB measurements of unprinted substrate; tolerances are given in Table 7.

5.2 Permanence and light fastness of the proofing substrates

The unprinted proofing substrates have been evaluated against permanence and light fastness according to [8]. Here each paper was exposed sequentially to the following conditions:

- 24 hours at 25 °C and a relative humidity of 25 %
- 24 hours at 40 °C and a relative humidity of 80 %
- 7 days at 40 °C and a relative humidity of 10 %.

For the same proofing substrate, the variability of colour under light exposure is limited by the condition that the light fastness as determined according to ISO 12040 shall be no less than 3. The test results are given in Table 10 and Table 11. For the primary solids CMYK the results are given in table 12.

Substrate	Δ E after permanence test	Tol. ΔE	OK?
PearlProof Super 240 g/m²	0,7	1,5	O. K.
PearlProof Super Glossy 240 g/m²	0,3	1,5	O. K.
Pearl Select 210 g/m²	0,8	1,5	O. K.

Table 11: Permanence of the proofing substrates.

Substrate	ΔE after light fastness test for information only	Tol. Light fastness	OK?
PearlProof Super 240 g/m²	0,3	≥ 3	O. K.
PearlProof Super Glossy 240 g/m²	0,7	≥ 3	O. K.
Pearl Select 210 g/m²	0,3	≥ 3	O. K.

Table 12: Light fastness of the proofing substrates [CIELAB colour difference are depicted for information only].

	ΔE for information only				OK?
	Cyan	Magenta	Yellow	Black	
Tol.	Light fastness ≥ 3 [according to ISO 12040]				
1	0,4	0,7	0,8	0,5	O. K.
2	0,1	0,3	0,2	0,5	O. K.
3	0,4	0,5	0,4	0,2	O. K.
4	0,3	0,1	0,6	0,3	O. K.
5	0,6	0,6	1,3	0,4	O. K.

Table 13: Light fastness of the primary solids [CIELAB colour difference for information only].

Furthermore the primary solids CMYK have been checked with respect to permanence for information only. The results are given in Table 13.

A CIELAB colour difference of 1,5 is used as tolerance. It is planned to use this tolerance in a revision of ISO 12647-7 [8].

	CIELAB colour differences				OK?
	Cyan	Magenta	Yellow	Black	
Tol.		ΔE = 1,5			
1	0,6	0,9	0,2	0,1	O. K.
2	0,2	0,3	0,3	0,4	O. K.
3	0,7	0,9	0,9	0,1	O. K.
4	0,8	0,1	0,4	0,3	O. K.
5	1,3	0,4	0,7	0,4	O. K.

Table 14: CIELAB colour differences of the primary solids CMYK after permanence and aging tests. [information only]

5.3 Colour accuracy [gamut included]

The proofs were created for the following printing conditions:

FOGRA39 - Commercial printing, paper type 1 or 2, i.e. gl. or matt coated art, 115 g/m^2, periodic screen according to 60/cm [150 lpi], solids and TVI according to ISO 12647-2:2004 / Amd 1 [1], TVI curves A [CMY] and B [K]

Die Table 15 shows the resulting colour accuracy based on the Ugra/Fogra Media Wedge CMYK 2.0.

	ΔE Paper	ΔE Avg	ΔE Max	ΔE Primaries	ΔH Primaries	ΔH Comp. Grey	OK?
Tol.	3	3	6	5	2,5	1,5	
1	1,1	1,1	2,8	2,7	0,6	0,4	O. K.
2	1,0	1,0	1,8	1,2	0,7	0,4	O. K.

3	1,1	1,3	3,3	2,3	0,8	0,3	O. K.
4	1,1	1,3	2,3	1,1	0,8	0,2	O. K.
5	0,7	1,3	2,4	1,4	1,4	0,2	O. K.

Table 15: Results of proof simulation

In addition, the colorimetrical accuracy was tested by comparing the measurement values of the proofed ISO 12642-2 test chart [ECI2002] and the pertinent characterisation data. These results as well as the gamut evaluation are given in Table 16.

	ΔE Avg	ΔE Gamut	95% Percentile	OK?
Tol.	4	4	6	
1	1,0	1,3	2,0	O. K.
2	1,1	1,2	1,9	O. K.
3	1,1	1,1	1,9	O. K.
4	1,1	1,0	1,8	O. K.
5	1,1	1,0	1,8	O. K.

Table 16: Colour difference between the ECI2002 tables and the pertinent characterisation data.

The results show a very high accuracy. Therefore all configurations are able to create contract proofs for the listed printing conditions.

5.4 Drift of the solids RGB and CMYK [Fading]

In order to measure the fading of the solids, the proofs were measured colorimetrically at a series of elapsed time intervals [5 min, 10 min, 20 min, 30, 45 min, 60 min, 120 min and 24 h]. Table 16

shows the colour differences between the proofs measured at 30 min and then again at 24 hours.

	C	M	Y	K	R	G	B	Tol.	OK?
1	0,0	0,2	0,1	0,1	0,4	0,2	0,2	1,5	O. K.
2	1,2	0,2	0,1	0,1	0,3	0,2	0,7	1,5	O. K.
3	0,2	0,0	0,6	0,3	0,1	0,4	0,2	1,5	O. K.
4	0,4	0,0	0,1	0,2	0,2	0,6	0,2	1,5	O. K.
5	0,2	0,2	0,2	0,2	0,2	0,2	0,1	1,5	O. K.

Table 17: Drift of the solids; CIELAB colour difference [ΔE] between measurements of 30 min and of 24 h after printing.

Thus it can be stated that the colour values after 24 h reasonably match the colour values 30 min after printing within the specified tolerance.

5.5 Homogeneity [flat grey tints]

Grey test targets [CMYK: 20 15 15 15; CMYK: 40 30 30 30; CMYK: 65 50 50 50] were used to evaluate the homogeneity of every combination. Colorimetrical measurements were made on 9 locations, evenly spaced across the print format. Tables 17 to 19 show the average grey tone CIELAB values, the standard deviation and the maximum ΔE with respect to the average. The variations lie well within the tolerance for the maxima and for the standard deviations.

	Average			σ L*	σ a*	σ b*	ΔE Max	OK?
	L*	a*	b*					
Tol.				0,5	0,5	0,5	2	
1	73,9	0,3	-1,8	0,1	0,1	0,0	0,2	O. K.
2	74,4	0,2	-1,6	0,1	0,1	0,0	0,2	O. K.
3	73,3	0,2	-2,0	0,1	0,1	0,1	0,3	O. K.
4	73,6	0,5	-1,5	0,1	0,1	0,1	0,2	O. K.
5	73,9	0,5	-1,3	0,1	0,1	0,1	0,2	O. K.

Table 18: Results of homogeneity measurements on flat grey tint 1 [CMYK: 20,15,15,15].

	Average			σ L*	σ a*	σ b*	ΔE Max	OK?
	L*	a*	b*					
Tol.				0,5	0,5	0,5	2	
1	53,4	-0,4	-2,6	0,1	0,0	0,0	0,1	O. K.
2	53,6	-0,6	-2,5	0,2	0,1	0,1	0,3	O. K.
3	53,3	-0,9	-1,4	0,1	0,1	0,0	0,2	O. K.
4	54,2	-0,8	-1,5	0,0	0,1	0,1	0,2	O. K.
5	54,3	-0,3	-1,2	0,1	0,1	0,1	0,2	O. K.

Table 19: Results of homogeneity measurements on flat grey tint 2 [CMYK: 40,30,30,30].

	Average			σ L*	σ a*	σ b*	ΔE Max	OK?
	L*	a*	b*					
Tol.				0,5	0,5	0,5	2	
1	32,8	-1,4	-0,7	0,1	0,0	0,0	0,1	O. K.

2	33,1	-2,0	-0,9	0,2	0,0	0,0	0,3	O. K.
3	32,7	-2,2	-0,9	0,3	0,1	0,0	0,6	O. K.
4	32,6	-1,3	-0,7	0,1	0,1	0,0	0,2	O. K.
5	33,3	-1,2	-0,4	0,1	0,1	0,1	0,2	O. K.

Table 20: Results of homogeneity measurements on flat grey tint 3 [CMYK: 65,50,50,50].

5.6 Short-term repeatability of the solids CMYK RGB and the midtones [50%] CMYK.

Table 21 shows the results of the test of the short-term repeatability of the solids CMYK RGB and the midtones [50%] CMYK. One hour after an initial print test, target 2 was printed again and colorimetrically measured. All tested combinations of media and printer showed a good short-term repeatability [less than ΔE=1,5].

	C	M	Y	K	R	G	B	C 50 %	M 50 %	Y 50 %	K 50 %	Tol.	OK?
1	0,4	0,3	0,3	0,3	0,2	0,5	0,2	0,1	0,4	0,3	0,4	1,5	OK
2	0,4	0,1	0,3	0,3	0,0	0,3	0,3	0,3	0,3	0,2	0,1	1,5	OK
3	0,6	0,7	1,5	0,3	0,2	0,7	0,3	0,5	0,4	0,7	0,3	1,5	OK
4	0,1	0,1	0,4	0,1	0,4	0,3	0,1	0,0	0,2	0,7	0,2	1,5	OK
5	0,2	0,4	0,3	0,3	0,4	0,4	0,5	0,1	0,5	0,3	0,1	1,5	OK

Table 21: Short-term repeatability; CIELAB colour differences [ΔE] between subsequent prints [1 h].

5.7 Long-term [day by day] repeatability of the solids CMYK RGB and the midtones [50%] CMYK

Table 21 shows the results of the test of the long-term repeatability of the solids CMYK RGB and the midtones [50%] CMYK. On two

separate days, test form 2 were printed and colorimetrically measured. All configurations show a good long-term repeatability [less than ΔE=1,5].

	C	M	Y	K	R	G	B	C 50 %	M 50 %	Y 50 %	K 50 %	Tol.	OK?
1	0,4	0,4	0,2	0,4	0,9	0,8	0,1	0,2	0,1	0,2	0,1	1,5	OK
2	0,2	0,2	0,2	0,2	0,3	0,2	0,5	0,2	0,2	0,2	0,2	1,5	OK
3	0,7	0,4	1,1	0,4	0,8	0,7	0,5	0,4	0,5	0,1	0,3	1,5	OK
4	0,8	0,6	0,2	0,5	0,4	0,5	0,5	0,5	0,3	0,4	0,5	1,5	OK
5	0,3	0,6	0,7	0,5	0,4	0,2	0,5	0,2	0,2	0,4	0,4	1,5	OK

Table 22: Long-term repeatability; CIELAB colour differences [ΔE] between subsequent prints [24 h].

5.8 Rub resistance [drying]

The time required for printed solids [CMYKRGB] to reach mechanical stability against a rubbing action should not exceed 30 min or the print stabilization period, whichever is longer. This test was performed for each configuration for which the proofing system is to be certified. Table 22 shows the results of the visually inspection of the printed test areas and the adjacent unprinted parts for traces of the rubbing of transferred colorant. Combinations 1 and 2 showed some visible traces after 30 minutes print stabilization period. In an extended test after 1h, 2h and 4h some visible traces still occurred. Proofs printed with these combinations must be handled especially carefully.

	Tol.	OK?
1	Some visible traces.	O. K.
2	Some visible traces.	O. K.
3	No significant traces.	O. K
4	No significant traces.	O. K.
5	No significant traces.	O. K.

Table 23: Results of the rub resistance test.

5.9 Tone value reproduction limits and reproduction of vignettes

Proofs of the test forms 2 and 3 containing vignettes were visually examined for banding. The findings for every printing condition are listed in Table 23. The test images of ISO 12640-1 and -3 show for combinations 2, 3, 4 and 5 no artefacts when viewed under standard lighting. Combination 1 showed some banding in the blue radial gradient.

	Results	OK?
1	Some banding.	O. K.
2	Smooth renditions.	O. K.
3	Smooth renditions.	O. K.
4	Smooth renditions.	O. K.
5	Smooth renditions.	O. K.

Table 24: Evaluation of vignettes.

5.10 Image register and resolving power

The maximum deviation between the image centres of any two printed colours shall not be larger than 0,05 mm. The resolving power of each proof print shall be such that C, M, K positive, non-

serif type of 2 point size, reverse [negative] of 8 point size and 2 point reverse line are legibly reproduced [8]. Also the Siemens stars of ISO 12640-1 have been evaluated. This test was carried out using the test form 3. The results are listed in Table 24.

	Max. deviation between image centres	non-serif type of 2 point size	non-serif reverse type [negative] of 8 point size	2 point reverse line	OK?
1	<0,05	legible	legible	legible	O.K.
2	<0,05	legible	legible	legible	O.K.
3	<0,05	legible	legible	legible	O.K.
4	<0,05	legible	legible	legible	O.K.
5	<0,05	legible	legible	legible	O.K.

Table 25: Evaluation of image register and resolving power.

5.11 Margin information

Every digital proof shall bear a human readable commentary [status] line according to ISO 12647-7 with the following information:

- ¬ Proofing system designation
- ¬ Colorants
- ¬ Substrate material types
- ¬ Printing condition to be simulated
- ¬ Date und time
- ¬ Colour management profile[s] used.

All information was printed on the evaluated proofs.

5.12 Tone value difference

The digital proof print shall reproduce the colorimetrical tone values given by the intended printing condition. Though the tone values are calculated using the method in ISO 12647-1 both from the CIEXYZ values of the proof and the CIEXYZ values of the intended printing condition. For all combinations the tone value difference shall be within a tolerance of ±5%. The differences for each combination are shown in Figure 1 to 5.

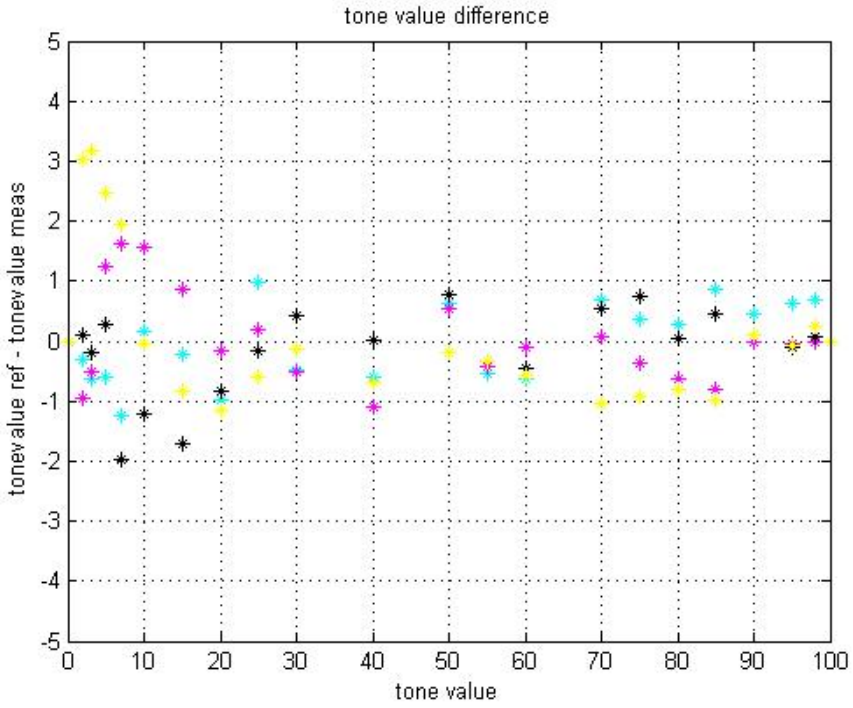

Figure 1: Tone value difference for combination 1.

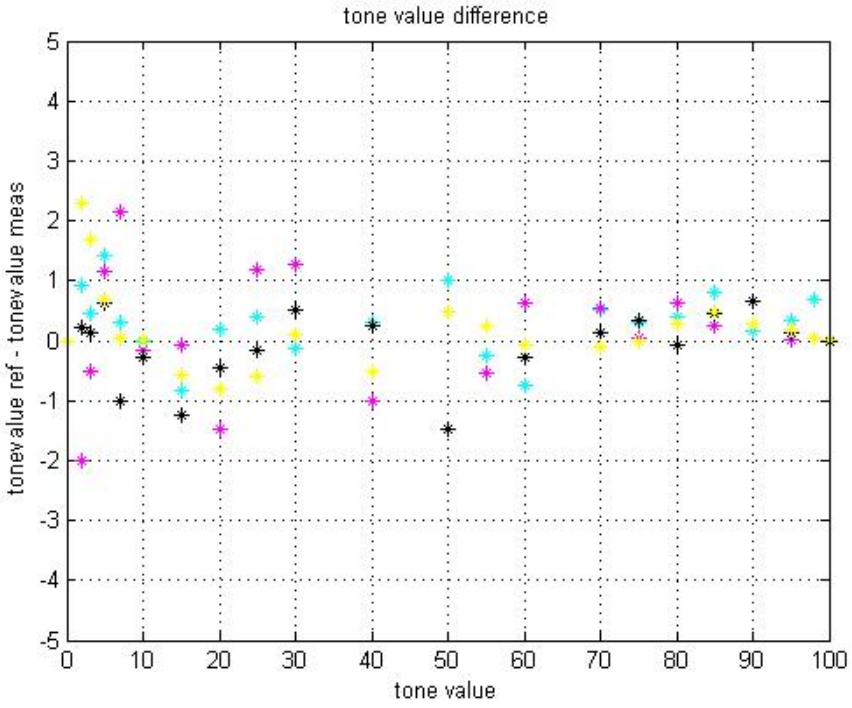

Figure 2: Tone value difference for combination 2.

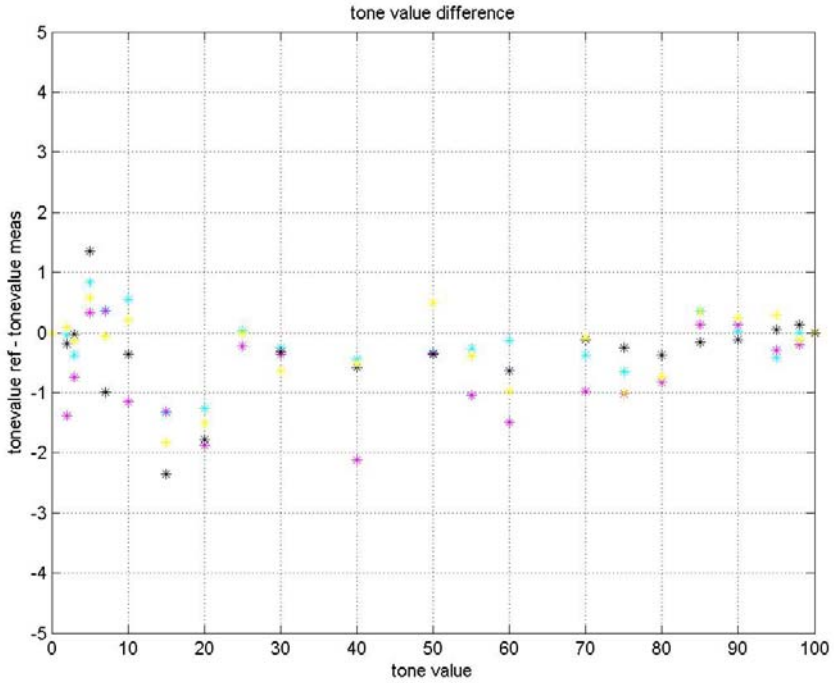

Figure 3: Tone value difference for combination 3.

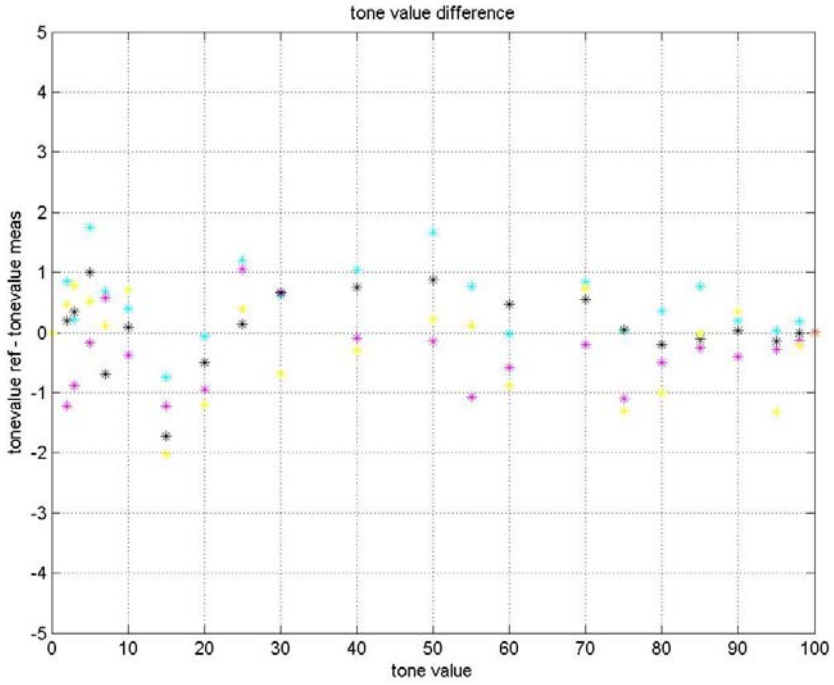

Figure 3: Tone value difference for combination 4.

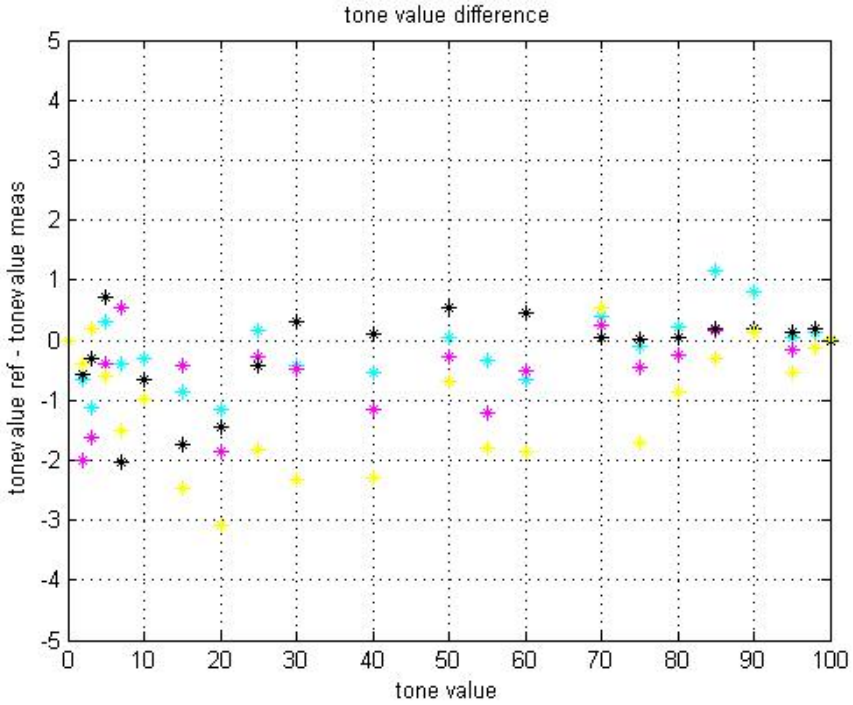

Figure 4: Tone value difference for combination 5.

6 Conclusion

The configurations listed in Table 25 were subject to this certification:

	Printing condition	Software	Printer	Substrate
1	FOGRA39	ORIS Color Tuner	HP Designjet Z3200	CGS PearlProof Super 240 g/m²
2	FOGRA39	ORIS Color Tuner	HP Designjet Z3200	CGS PearlProof Super Glosy 240 g/m²
3	FOGRA39	ORIS Color Tuner	Epson Stylus Pro 7900	CGS PearlProof Super 240 g/m²
4	FOGRA39	ORIS Color Tuner	Epson Stylus Pro 7900	CGS PearlProof Super Glosy 240g/m²
5	FOGRA39	ORIS Color Tuner	Epson Stylus Pro 7900	CGS PearlProof Select 210g/m²

Table 26: Tested configurations.