Aardenburg
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IMAGING & ARCHIVES

Tested System:
ID#:263

Printer: Epson Stylus Pro 3800

Inks/Colorants: Inkjetfly IMA24/36 V3

Media: Harman by Hahnemuhle Matte Cotton Smooth 300gsm

Coating(s): no additional coating

Sample #: AaI_20110127_SN007

Testing Status: 100 Megalux hours total light exposure

Testing Is ongoing, next update on approximately JAN 05, 2015

Conservation Display Rating (CDR)

Lower limit: 28 Megalux hours (for weakest 10% of the color patches)
Upper limit: 69 Megalux hours (for average of all the color patches)

Note: a CDR with narrow range (typically less than 2:1) indicates relatively even overall fading of the image. A wide range indicates faster fading in certain local colors/tones prior to general fading of most colors/tones in the entire image. Compare ratings for different systems directly and/or use the table on page 2 to estimate time (years) on display.

* Please read document AaI_2009_0118_TA-01.pdf, **"An Overview of the AaI&A Conservation Display Ratings"**, located on the Documents page of the AaI&A website for furhter explanation of the Conservation display ratings.

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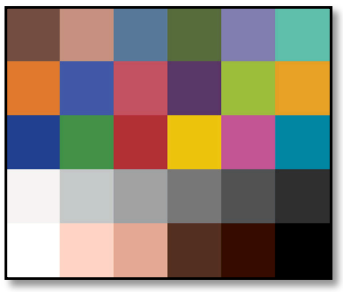
Aardenburg Imaging & Archives

About this Report

This report contains light fastness information about a sample test print produced by a specific digital printing system. "System" refers to all hardware, software, and materials used to make the finished print. The hardware, software, material components, and printmaker's skills contribute to the final image quality and image permanence. The tested sample is made with current or recently discontinued stocks of commercially available products unless otherwise stated. Each sample has been prepared by Aardenburg Imaging & Archives or one of its members in accordance with customary print making practices unless otherwise noted. The sample may also contain additional finishing materials such as overcoats and laminates which are also noted when used. Finally, the sample has been tested under standardized conditions that are defined on the Sample Description page (see page 4). AaI&A makes every effort to ensure but cannot guarantee that the samples are properly identified and documented and that test results are accurate. For this reason, AaI&A also strives to test independently produced sample replicates in order to increase sampling confidence and to provide information on process variability. Please compare the results in this report to replicate test samples when the data become available.

Understanding this Report



The magnitude and visual appearance of fading depends not only on the chosen printing system but the chosen image as well. In other words, different images are comprised of different colors, and the fading relationships between those colors dictate how the image will look as it fades. The sample print in this test report was made by reproducing the digital image shown on the left. It contains 30 standard colors. 24 of the colors are colorimetrically matched to the Macbeth ColorChecker™ chart viewed under D50 illumination. The remaining six colors supplement the ColorChecker™ array with four additional skin tone colors, one patch for paper white, and another for maximum black. The additional colors also round out the distribution of CIELAB L* (lightness) values in the test target.

Information about the fading characteristics of the product is provided in three ways:

1) You can visually assess the fading. The target images reproduced in this report are digitally reconstructed from the spectrally measured color data rather than scanning or otherwise reproducing the physical print by conventional techniques. This method ensures a colorimetrically accurate representation of the print appearance as the print fades. A calibrated monitor is recommended to experience the best possible reproduction of the test sample appearance. The side-by-side "before and after" presentation of the target images simulates looking at a perfect copy of the unexposed original print along side the same print after light exposure. You can also use Adobe Reader's full screen mode to cycle through the pages and "animate" the fading.

2) I* Color and tonal accuracy scores are reported. This report includes I* metric scores that compare the color and tonal relationships of the light exposed samples to the color and tonal relationships existing in the original print prior to light exposure. Perfect I* scores of 100% can be approached when no significant fading occurs. Average scores above 90% generally indicate excellent retention of original quality, 80% good, 70% fair, etc., but your conclusions may vary depending on your image quality requirements. I* color rates the retained color accuracy (hue and chroma) while I* tone rates the retained tonal accuracy (lightness and contrast). The score is on a percentile scale where 100% is a perfect match between the comparison image (e.g., "after" light exposure) and the reference image (e.g., "before" any light exposure). 0% I* color means no color accuracy is left. 0% I* tone means essentially no tonality remains and all image information content is lost. Negative I* values have significance as well and contribute to the average I* score when they occur. Negative I* color values mean false color has occurred, for example, when a skin tone turns green or a neutral gray becomes distinctly colorful. Negative I* tone scores mean visual contrast between colors has become inverted (i.e., like the tonal relationships in a photographic film negative). Serious image quality problems must arise before false colors and/or tones appear. For more information on the I* metric, please refer to the AaI&A web site.

3) Color changes are also reported using the classic color difference model, ΔE. Note that ΔE values lose perceptual scaling significance when they become large (e.g., > 15). Also, the ΔE equation does not unambiguously measure changes in image contrast. This limitation is generally not a problem for paints and textiles, but can be a serious oversight when evaluating photographic images. Properly tracking changes in image contrast was a major reason behind the development of the I* metric.

Table to Convert Megalux-hours of Light Exposure to estimated "Years on Display"											
Indoor Light Levels for Print Display		Multiply Mlux-hrs by	Megalux-hours in test								
Light Exposure	**Description**		**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
≤ 10 Lux 24 hours per day	Interior rooms, storage areas, or hallways without windows, illuminated sparingly by artificial lighting	**11.4**	**114**	**228**	**342**	**457**	**571**	**685**	**799**	**913**	**1027**	**1142**
50 Lux 12 hours per day	"Museum Standard" display condition	**4.6**	**46**	**91**	**137**	**183**	**228**	**274**	**325**	**365**	**411**	**457**
120 Lux 12 hours per day "Kodak Display Years" (1)	Average home illumination level for photos is ~ 60 lux. 90% of all displayed photos do not exceed 120 lux (1).	**1.9**	**19**	**38**	**57**	**76**	**95**	**114**	**133**	**152**	**171**	**190**
228 Lux 12 hours per day	Relatively bright home or office. Note the simple 1:1 relationship between "years on display" and Mlux-hr values at this condition.	**1.0**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
450 Lux 12 hours per day "WIR Display Years" (2) Also equals 500 lux for 11.8 hours per day	A bright home or commercial office building illumination level is 200-500 lux. Also, good illumination for color critical viewing and color matching tasks begins at about 500 lux.	**0.5**	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**41**	**46**	**51**

Light levels commonly encountered in the real world fluctuate widely throughout indoor print display environments and produce large variations in how long it takes for artwork to acquire light-induced damage. Use this table as a guide to estimate how many "years on display" (denoted in red text) it takes to accumulate the light exposure test dosage. Review the test results to decide which Megalux-hour dose has caused fading to your level of concern (e.g., just noticeable, easily noticeable, objectionable, etc.). Then choose the print display description that best represents how your print is likely to be displayed. You may want to obtain a lux meter and make some measurements in your own display environment!

Note that as the years of display time increase, light-induced fading can be eclipsed by other serious aging mechanisms such as fading and/or staining caused by heat, humidity, and air pollutants. Mould damage can also occur at high humidity. Even when colorants remain water fast, direct contact with liquids may result in physical deformation and staining of the substrate. Also, temperature and especially humidity cycling can cause physical cracks and/or flaking, etc. Handling damage such as scratching, abrasion, tears and creases, and catastrophic damage by smoke, fire, flood, etc., also degrade print quality over time. Thus, as illumination levels are reduced other forms of degradation take on greater proportion of risk and may appear in shorter time intervals.

(1) Eastman Kodak cited this exposure condition with a 90% confidence limit as a rationale for estimating print fading times of traditional color photo materials in typical home display environments. For light fading claims regarding its newer line of pigment-based inkjet printers, Kodak adopted the higher level of 450lux/12 hours per day which is also used by Wilhelm Imaging Research, Inc. (See below).

(2) Wilhelm Imaging Research (WIR) standardized its light fastness ratings on 450 lux for 12 hours per day in order to estimate the years on display necessary to reach "easily noticeable" fading. This average daily light exposure dose (at 75˚F/60%RH assumed temperature and humidity levels) used in conjunction with WIR's visually weighted densitometric endpoint criteria set V3.0 became a de facto industry standard during the first decade of the 21st century in the absence of a published International Standards Organization (ISO) test standard. However, the WIR V3.0 visual criteria set used to predict "easily noticeable fade" was designed for traditional 20th century silver–halide color photofinishing processes. It is not well suited to the evaluation of modern digital media. Nevertheless, the WIR assumed daily light exposure dose is one of many commonly encountered light exposure conditions existing within the range of real world picture display locations.

Sample Description

Sample # **AaI_20110127_SN007** **Batch #:** L1
Printer: Epson Stylus Pro 3800
Ink: Inkjetfly IMA24/36 V3
Media: Harman by Hahnemuhle Matte Cotton Smooth 300gsm
Coating(s): no additional coating

Test Print Prepared by: AaI&A member
Printed: January 27, 2011
Initial Print colors measured February 5, 2012
Test Started: February 6, 2012

Test Image: AaI_StandardColorSet(v2)forSRGB.tif
RIP?Driver settings: CS5 PS, Epson OEM driver, 1440 dpi, High speed ÒonÓ, no color adjust (NCA), paper thickness = 4

Media Setting Enhanced Matte Paper

Profile: Epson Stylus Pro 3800_HbyHMCS_IJFV3.icc **Rendering** Perceptual w/BPC
Profile type: custom

Paper White Color (UV-included versus UV-excluded)

Optical Brighteners Present? *yes (high)*	**L***		**a***		**b***	
	UV inc	UV exc	UV inc	UV exc	UV inc	UV exc
Media Whitepoint Color	97.7	97.5	1.9	0.2	-4.1	1.2
	UV-inc/UV-exc ΔL*, Δa*, Δb* respectively					
	0.2		1.7		5.3	
	Calculated differences, especially for Δb, indicate the role and magnitude of fluorescence on original paper color*					

Maximum Printed Black	**L***	**a***	**b***	Optical Density (Dmax)
	19.6	0.9	0.6	1.54

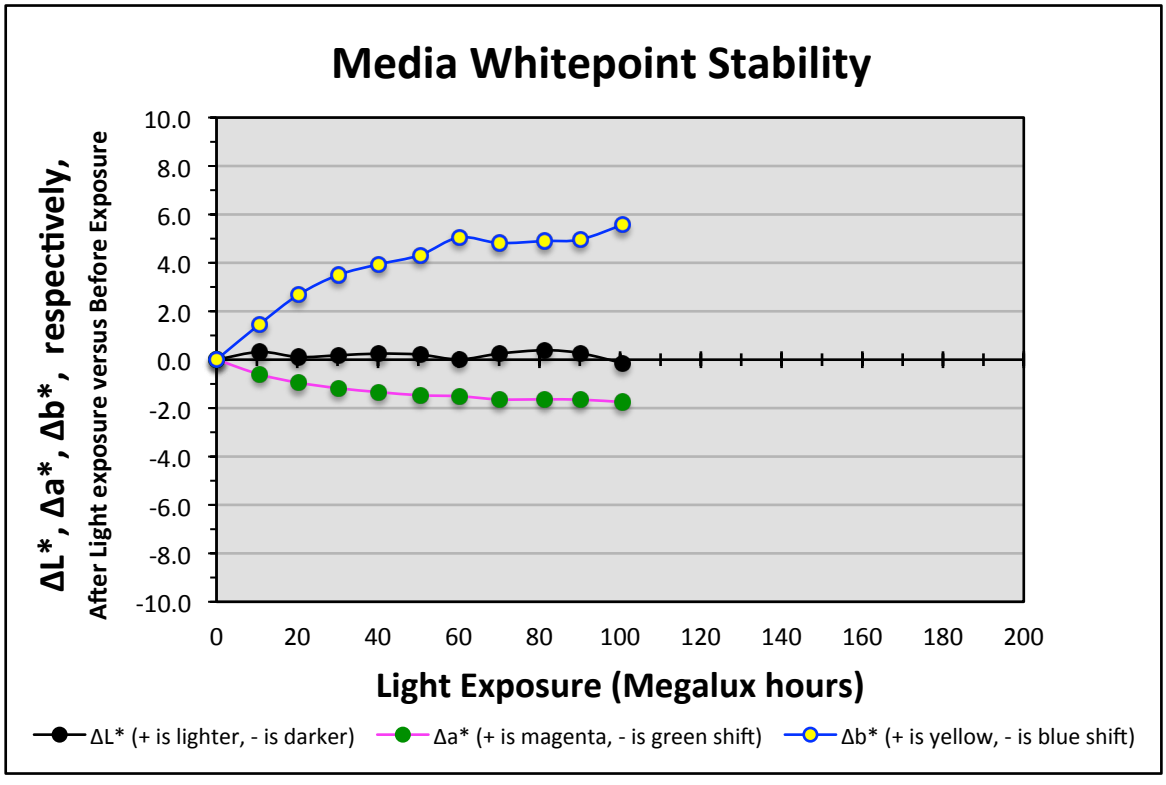
Light source: Phillips Colortone F40T12/C50 – 5000˚K full spectrum fluorescent. Color rendering Index (CRI) =92), soda lime glass filtered
Light Exposure Cycle: 8 hours on, 4 hours off, twice per 24 hours
CIELAB measurements: D50 2˚ observer, Xrite Gretag/Macbeth Spectrolino/Spectroscan

Average Illuminance during "on" cycle: **10429 Lux**
Average Temperature: 23.8˚C over full test duration, 25.3˚C during light exposure.
Average Relative humidity: 55.7%RH over full test duration, 55.7%RH during light exposure.

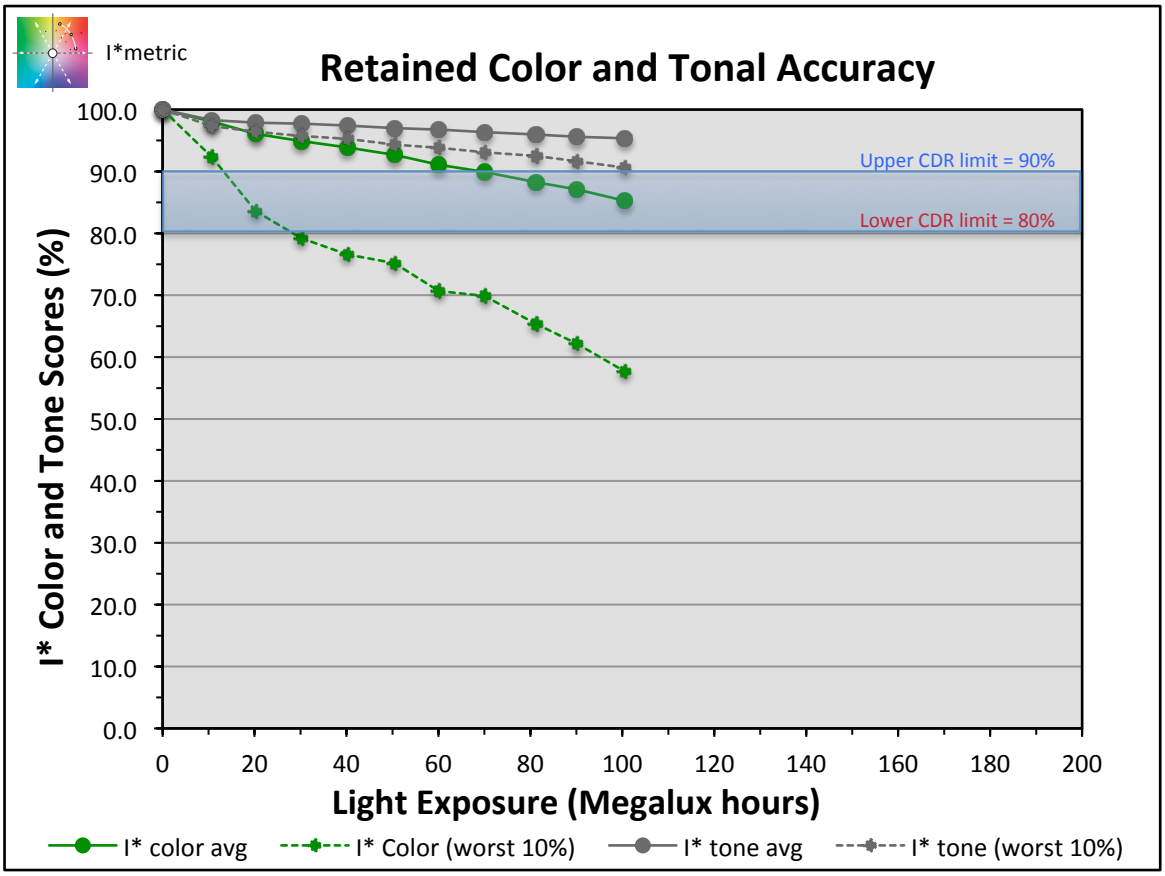
Notes/Comments:

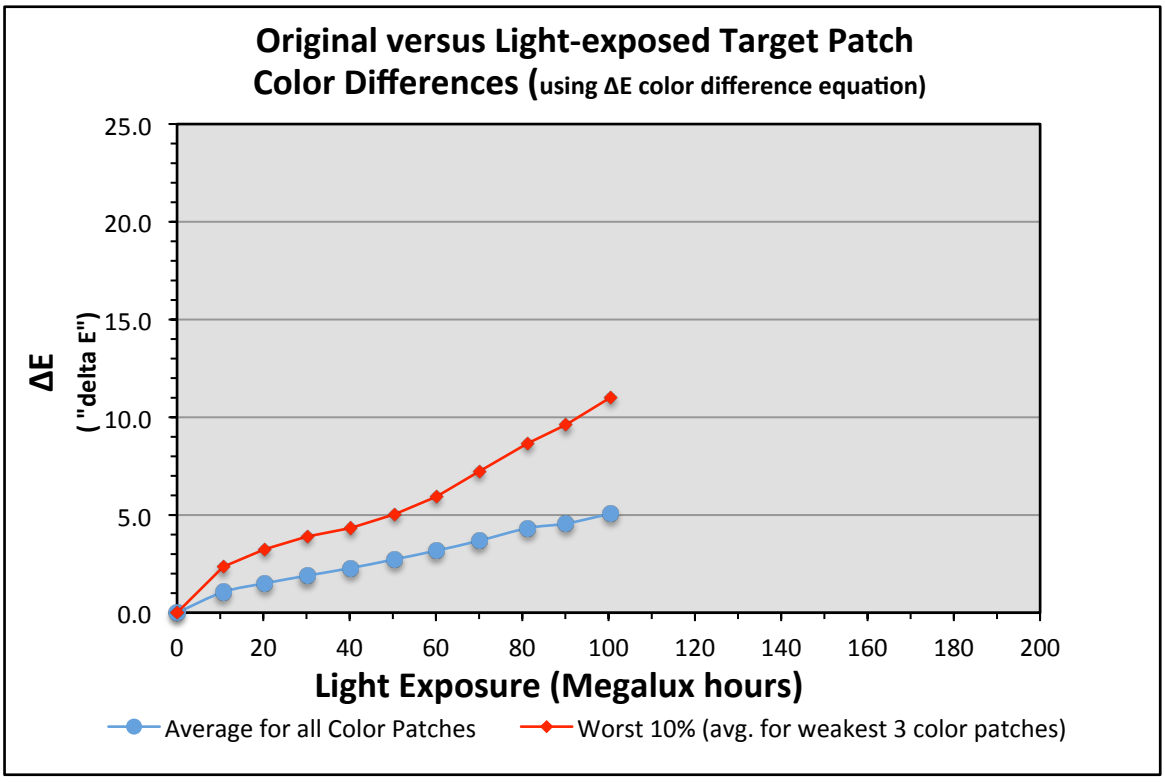
Graphs:

Epson Stylus Pro 3800, Inkjetfly IMA24/36 V3, Harman by Hahnemuhle Matte Cotton Smooth 300gsm, no additional coating

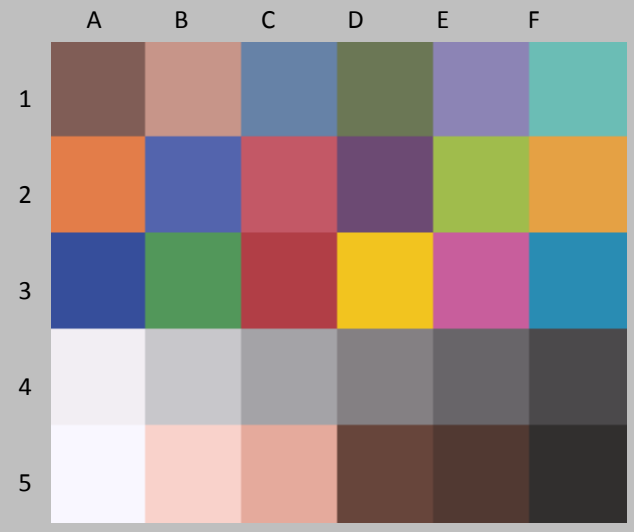


Epson Stylus Pro 3800, Inkjetfly IMA24/36 V3, Harman by Hahnemuhle Matte Cotton Smooth 300gsm, no additional coating

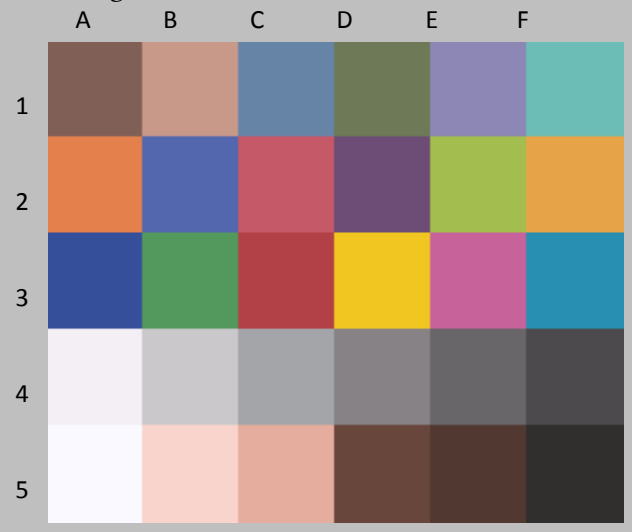




Values: *Epson Stylus Pro 3800, Inkjetfly IMA24/36 V3, Harman by Hahnemuhle Matte Cotton Smooth 300gsm, no additional coating*



Original Print Colors before light exposure



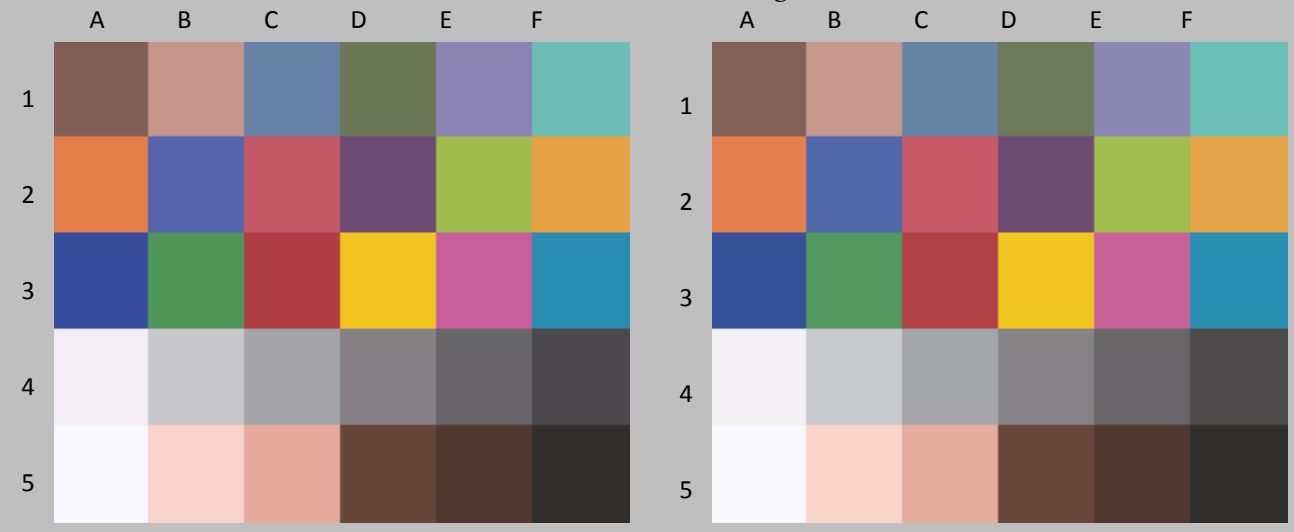
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	100.0	0.7	43.0	43.6	13.8	13.4	9.7	9.8
B1	Light Skin	99.0	1.0	66.4	67.0	18.1	17.4	14.4	14.6
C1	Blue sky	96.7	1.4	53.1	53.7	-2.5	-3.6	-23.0	-22.3
D1	Foliage	100.0	0.6	48.4	48.9	-9.3	-9.5	17.2	16.9
E1	blue flower	94.8	2.1	57.2	57.9	11.1	9.7	-25.5	-24.1
F1	bluish green	100.0	0.6	71.2	71.5	-28.0	-28.3	-3.5	-3.9
A1	orange	99.4	1.1	63.5	64.3	36.9	36.0	46.2	46.1
B2	purplish blue	95.5	2.6	43.5	44.3	9.8	7.9	-42.4	-40.8
C2	moderate red	100.0	0.8	51.6	52.3	45.4	44.9	14.0	14.2
D2	purple	98.1	1.2	36.6	37.2	21.1	20.4	-18.5	-17.7
E2	yellow green	99.8	0.8	72.7	73.3	-22.1	-22.3	52.4	51.9
F2	orange yellow	99.3	1.1	71.8	72.4	20.3	19.5	56.6	56.2
A3	blue	97.1	2.0	34.5	35.1	11.3	9.7	-45.6	-44.6
B3	green	99.3	0.9	57.0	57.5	-32.6	-32.7	24.9	24.1
C3	red	100.0	0.6	43.5	43.7	47.6	47.2	22.3	22.0
D3	yellow	99.6	1.0	81.5	82.0	6.7	5.9	78.5	78.3
E3	magenta	96.3	2.4	54.8	55.5	47.8	46.5	-12.5	-10.6
F3	cyan	99.1	1.0	54.1	54.6	-18.8	-19.6	-28.7	-28.4
A4	white	93.7	1.2	94.6	95.0	2.2	1.6	-2.4	-1.5
B4	neutral 8	95.6	1.1	80.4	81.0	1.3	0.6	-2.0	-1.4
C4	neutral 6.5	96.5	1.0	67.2	67.8	0.7	0.2	-2.5	-1.9
D4	neutral 5	98.5	0.8	54.3	54.8	2.0	1.5	-1.3	-0.9
E4	neutral 3.5	100.0	0.7	43.0	43.5	1.9	1.5	-1.7	-1.5
F4	black	100.0	0.4	31.4	31.7	1.2	1.1	-0.7	-0.6
A5	paper white	88.5	1.6	97.6	97.9	2.0	1.4	-4.2	-2.8
B5	Skin highlight L*=88	96.4	1.2	87.4	88.0	13.2	12.3	8.8	9.4
C5	Skin highlight L* =75	98.3	1.2	75.0	75.7	21.0	20.1	15.7	16.1
D5	Skin shadow L*=28	100.0	0.5	32.9	33.3	13.9	13.8	11.7	11.8
E5	Skin shadow L*=13	100.0	0.2	26.6	26.7	10.3	10.4	8.7	8.7
F5	Maximum Black	100.0	0.1	19.6	19.7	0.9	0.9	0.6	0.6

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	98.1	98.3	1.1
Worst 10% (3 lowest scoring patches)	92.3	97.3	2.4

10 Megalux hours

Epson Stylus Pro 3800, Inkjetfly IMA24/36 V3, Harman by Hahnemuhle Matte Cotton Smooth 300gsm, no additional coating



Original Print Colors before light exposure

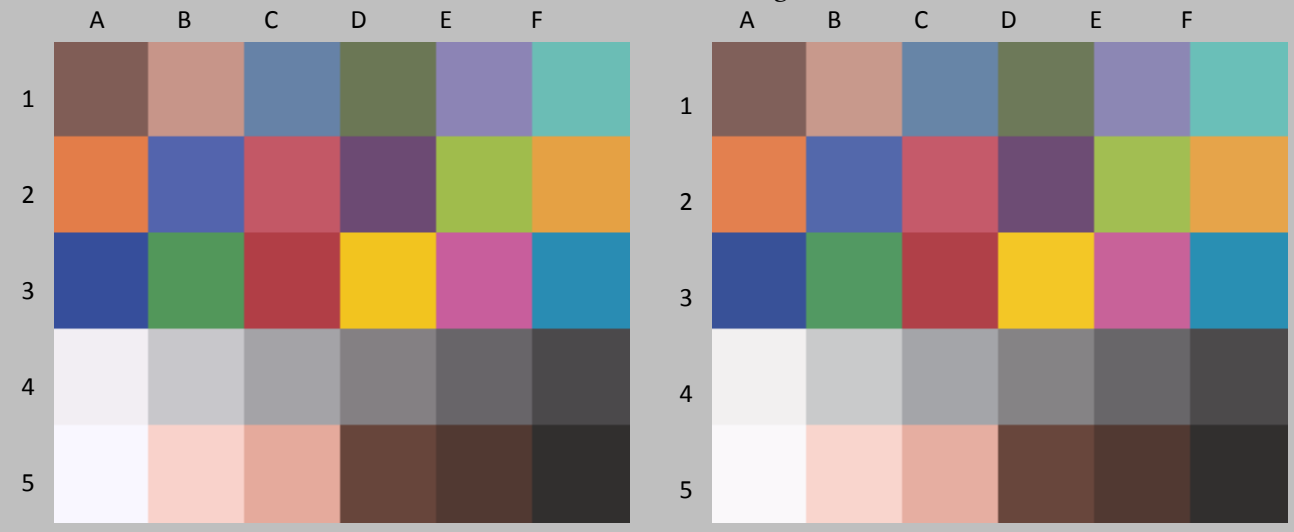
Colors After light exposure

				L*		a*		b*	
Patch #	Description	I* Color	ΔE	Before	After	Before	After	Before	After
A1	Dark Skin	100.0	1.0	43.0	43.9	13.8	13.4	9.7	9.6
B1	Light Skin	98.8	1.1	66.4	67.2	18.1	17.3	14.4	14.3
C1	Blue sky	94.2	2.0	53.1	53.9	-2.5	-3.9	-23.0	-21.8
D1	Foliage	98.6	1.0	48.4	49.0	-9.3	-9.5	17.2	16.4
E1	blue flower	91.9	2.9	57.2	58.0	11.1	9.3	-25.5	-23.4
F1	bluish green	98.4	1.0	71.2	71.6	-28.0	-28.4	-3.5	-4.4
A1	orange	98.6	1.6	63.5	64.4	36.9	35.8	46.2	45.4
B2	purplish blue	93.3	3.5	43.5	44.4	9.8	7.3	-42.4	-40.0
C2	moderate red	99.8	1.0	51.6	52.4	45.4	44.8	14.0	13.8
D2	purple	96.4	1.7	36.6	37.3	21.1	20.3	-18.5	-17.2
E2	yellow green	98.5	1.4	72.7	73.3	-22.1	-22.2	52.4	51.1
F2	orange yellow	98.3	1.7	71.8	72.5	20.3	19.3	56.6	55.5
A3	blue	95.1	2.9	34.5	35.2	11.3	9.1	-45.6	-43.8
B3	green	97.3	1.7	57.0	57.6	-32.6	-32.6	24.9	23.3
C3	red	99.2	1.0	43.5	43.8	47.6	47.1	22.3	21.6
D3	yellow	99.2	1.3	81.5	82.1	6.7	5.9	78.5	77.7
E3	magenta	94.5	3.3	54.8	55.6	47.8	46.1	-12.5	-9.8
F3	cyan	97.4	1.5	54.1	54.7	-18.8	-19.9	-28.7	-27.9
A4	white	83.9	2.0	94.6	94.8	2.2	1.3	-2.4	-0.6
B4	neutral 8	91.5	1.4	80.4	80.9	1.3	0.4	-2.0	-1.1
C4	neutral 6.5	92.9	1.3	67.2	67.8	0.7	-0.1	-2.5	-1.6
D4	neutral 5	96.7	1.0	54.3	54.9	2.0	1.4	-1.3	-0.8
E4	neutral 3.5	100.0	0.8	43.0	43.6	1.9	1.5	-1.7	-1.4
F4	black	100.0	0.5	31.4	31.8	1.2	1.1	-0.7	-0.5
A5	paper white	75.3	2.8	97.6	97.7	2.0	1.0	-4.2	-1.5
B5	Skin highlight L*=88	94.4	1.5	87.4	87.9	13.2	12.0	8.8	9.5
C5	Skin highlight L* =75	97.7	1.4	75.0	75.8	21.0	19.9	15.7	15.9
D5	Skin shadow L*=28	100.0	0.4	32.9	33.3	13.9	13.9	11.7	11.6
E5	Skin shadow L*=13	100.0	0.2	26.6	26.7	10.3	10.5	8.7	8.7
F5	Maximum Black	100.0	0.1	19.6	19.6	0.9	1.0	0.6	0.6

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	96.1	97.9	1.5
Worst 10% (3 lowest scoring patches)	83.6	96.4	3.2

20 Megalux hours

Epson Stylus Pro 3800, Inkjetfly IMA24/36 V3, Harman by Hahnemuhle Matte Cotton Smooth 300gsm, no additional coating



Original Print Colors before light exposure

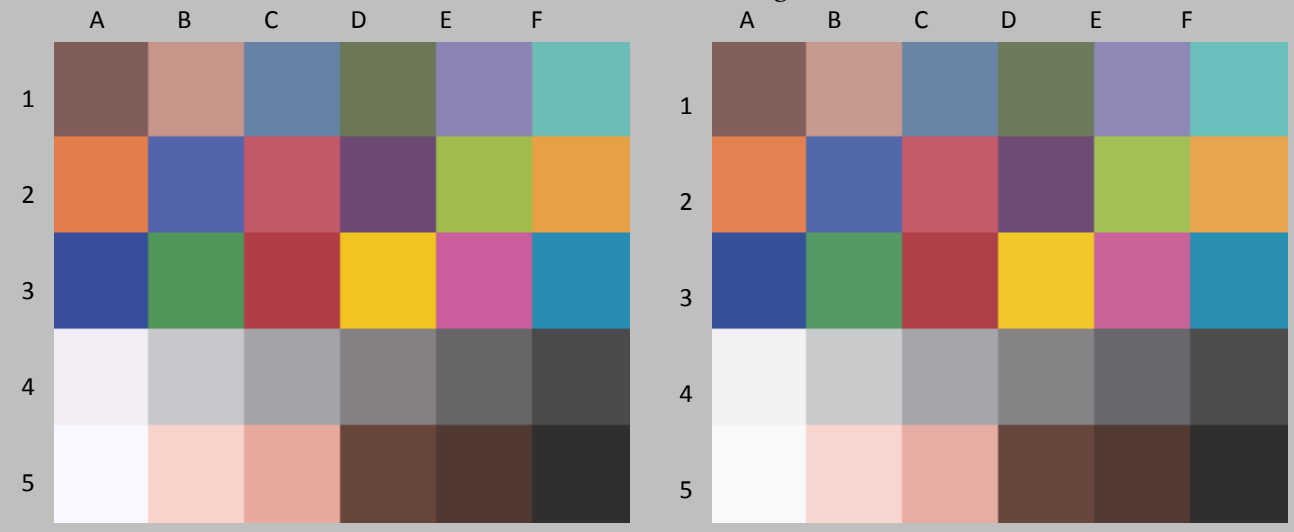
Colors After light exposure

				L*		a*		b*	
Patch #	Description	I* Color	ΔE	Before	After	Before	After	Before	After
A1	Dark Skin	99.2	1.1	43.0	43.9	13.8	13.4	9.7	9.2
B1	Light Skin	97.2	1.5	66.4	67.3	18.1	17.2	14.4	13.6
C1	Blue sky	93.2	2.2	53.1	53.9	-2.5	-4.0	-23.0	-21.6
D1	Foliage	95.8	1.5	48.4	49.1	-9.3	-9.4	17.2	15.9
E1	blue flower	89.9	3.4	57.2	58.1	11.1	8.9	-25.5	-23.0
F1	bluish green	95.1	2.0	71.2	71.8	-28.0	-27.9	-3.5	-5.4
A1	orange	97.1	2.4	63.5	64.4	36.9	35.6	46.2	44.3
B2	purplish blue	91.5	4.3	43.5	44.5	9.8	6.8	-42.4	-39.4
C2	moderate red	98.6	1.4	51.6	52.4	45.4	44.8	14.0	13.0
D2	purple	95.4	2.0	36.6	37.3	21.1	20.1	-18.5	-17.0
E2	yellow green	96.8	2.4	72.7	73.5	-22.1	-22.3	52.4	50.1
F2	orange yellow	96.8	2.6	71.8	72.7	20.3	19.1	56.6	54.5
A3	blue	93.7	3.5	34.5	35.3	11.3	8.6	-45.6	-43.4
B3	green	94.8	2.7	57.0	57.8	-32.6	-32.5	24.9	22.3
C3	red	98.6	1.3	43.5	43.8	47.6	47.1	22.3	21.2
D3	yellow	98.1	2.2	81.5	82.2	6.7	5.6	78.5	76.8
E3	magenta	93.8	3.7	54.8	55.7	47.8	45.8	-12.5	-9.5
F3	cyan	97.8	1.4	54.1	54.8	-18.8	-19.9	-28.7	-28.1
A4	white	81.3	2.3	94.6	95.0	2.2	1.2	-2.4	-0.4
B4	neutral 8	92.9	1.4	80.4	81.1	1.3	0.4	-2.0	-1.3
C4	neutral 6.5	94.0	1.3	67.2	68.0	0.7	0.0	-2.5	-1.7
D4	neutral 5	98.0	1.0	54.3	55.0	2.0	1.4	-1.3	-1.0
E4	neutral 3.5	99.7	0.9	43.0	43.7	1.9	1.4	-1.7	-1.5
F4	black	100.0	0.6	31.4	31.9	1.2	1.1	-0.7	-0.5
A5	paper white	66.4	3.7	97.6	97.8	2.0	0.8	-4.2	-0.7
B5	Skin highlight L*=88	95.0	1.5	87.4	88.1	13.2	11.9	8.8	8.9
C5	Skin highlight L* =75	96.8	1.7	75.0	75.9	21.0	19.9	15.7	14.9
D5	Skin shadow L*=28	100.0	0.6	32.9	33.4	13.9	13.9	11.7	11.6
E5	Skin shadow L*=13	100.0	0.3	26.6	26.7	10.3	10.5	8.7	8.9
F5	Maximum Black	100.0	0.1	19.6	19.7	0.9	1.0	0.6	0.7

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	94.9	97.7	1.9
Worst 10% (3 lowest scoring patches)	79.2	95.7	3.9

30 Megalux hours

Epson Stylus Pro 3800, Inkjetfly IMA24/36 V3, Harman by Hahnemuhle Matte Cotton Smooth 300gsm, no additional coating



Original Print Colors before light exposure

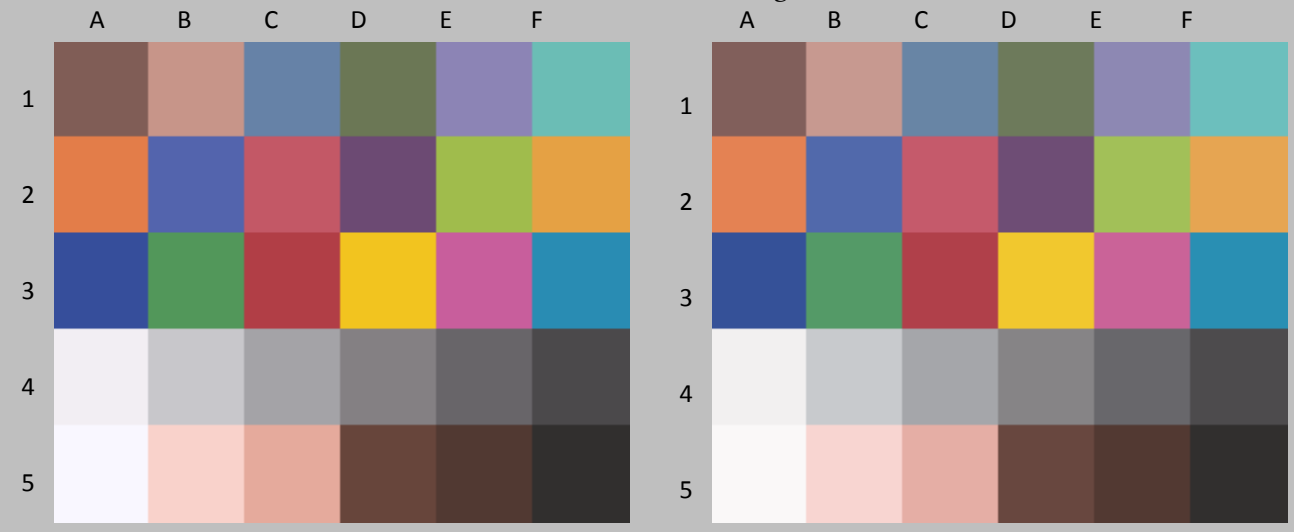
Colors After light exposure

				L*		a*		b*	
Patch #	Description	I* Color	ΔE	Before	After	Before	After	Before	After
A1	Dark Skin	97.4	1.4	43.0	44.0	13.8	13.5	9.7	8.8
B1	Light Skin	95.7	1.9	66.4	67.5	18.1	17.4	14.4	13.0
C1	Blue sky	92.7	2.4	53.1	54.0	-2.5	-4.1	-23.0	-21.5
D1	Foliage	92.7	2.1	48.4	49.3	-9.3	-9.3	17.2	15.3
E1	blue flower	88.8	3.8	57.2	58.3	11.1	8.8	-25.5	-22.7
F1	bluish green	91.8	2.9	71.2	71.9	-28.0	-27.7	-3.5	-6.3
A1	orange	95.7	3.3	63.5	64.6	36.9	35.6	46.2	43.4
B2	purplish blue	90.5	4.8	43.5	44.6	9.8	6.6	-42.4	-39.1
C2	moderate red	97.6	1.9	51.6	52.6	45.4	44.8	14.0	12.4
D2	purple	94.7	2.2	36.6	37.5	21.1	20.0	-18.5	-16.8
E2	yellow green	94.8	3.6	72.7	73.7	-22.1	-22.3	52.4	49.0
F2	orange yellow	95.4	3.5	71.8	72.9	20.3	19.0	56.6	53.6
A3	blue	92.9	3.9	34.5	35.4	11.3	8.4	-45.6	-43.1
B3	green	92.3	3.8	57.0	58.0	-32.6	-32.4	24.9	21.2
C3	red	98.0	1.6	43.5	44.0	47.6	47.2	22.3	20.8
D3	yellow	97.0	3.0	81.5	82.4	6.7	5.4	78.5	76.0
E3	magenta	93.0	4.1	54.8	55.8	47.8	45.7	-12.5	-9.2
F3	cyan	98.0	1.5	54.1	54.9	-18.8	-19.8	-28.7	-28.0
A4	white	79.5	2.5	94.6	95.0	2.2	1.1	-2.4	-0.2
B4	neutral 8	94.0	1.3	80.4	81.2	1.3	0.4	-2.0	-1.4
C4	neutral 6.5	94.9	1.3	67.2	68.0	0.7	0.0	-2.5	-1.9
D4	neutral 5	98.2	1.0	54.3	55.1	2.0	1.4	-1.3	-1.1
E4	neutral 3.5	100.0	1.0	43.0	43.8	1.9	1.4	-1.7	-1.6
F4	black	100.0	0.7	31.4	32.0	1.2	1.0	-0.7	-0.5
A5	paper white	61.5	4.2	97.6	97.8	2.0	0.6	-4.2	-0.3
B5	Skin highlight L*=88	94.4	1.7	87.4	88.3	13.2	11.9	8.8	8.4
C5	Skin highlight L* =75	95.3	2.1	75.0	76.1	21.0	19.8	15.7	14.4
D5	Skin shadow L*=28	100.0	0.7	32.9	33.5	13.9	13.9	11.7	11.4
E5	Skin shadow L*=13	100.0	0.5	26.6	26.8	10.3	10.5	8.7	9.0
F5	Maximum Black	100.0	0.1	19.6	19.7	0.9	1.0	0.6	0.7

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	93.9	97.4	2.3
Worst 10% (3 lowest scoring patches)	76.6	95.3	4.3

40 Megalux hours

Epson Stylus Pro 3800, Inkjetfly IMA24/36 V3, Harman by Hahnemuhle Matte Cotton Smooth 300gsm, no additional coating



Original Print Colors before light exposure

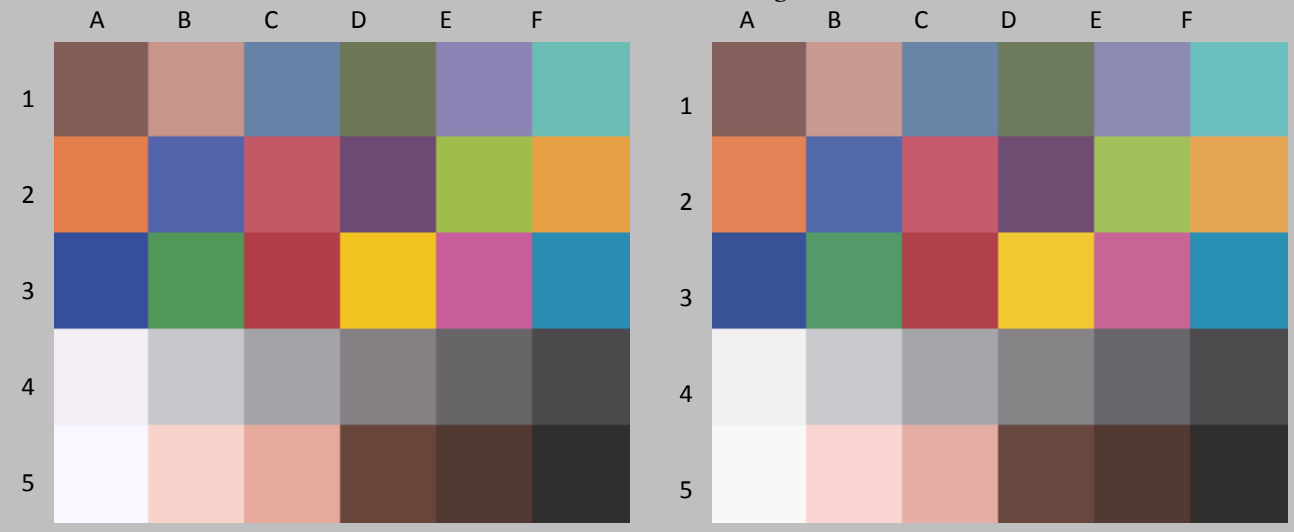
Colors After light exposure

				L*		a*		b*	
Patch #	Description	I* Color	ΔE	Before	After	Before	After	Before	After
A1	Dark Skin	95.0	1.7	43.0	44.1	13.8	13.6	9.7	8.4
B1	Light Skin	92.6	2.5	66.4	67.6	18.1	17.4	14.4	12.3
C1	Blue sky	92.0	2.6	53.1	54.2	-2.5	-4.2	-23.0	-21.4
D1	Foliage	89.3	2.8	48.4	49.4	-9.3	-9.2	17.2	14.6
E1	blue flower	87.7	4.1	57.2	58.4	11.1	8.6	-25.5	-22.5
F1	bluish green	88.0	4.0	71.2	72.0	-28.0	-27.4	-3.5	-7.3
A1	orange	93.8	4.4	63.5	64.8	36.9	35.5	46.2	42.2
B2	purplish blue	89.6	5.2	43.5	44.7	9.8	6.3	-42.4	-38.7
C2	moderate red	96.3	2.5	51.6	52.7	45.4	44.9	14.0	11.8
D2	purple	94.4	2.3	36.6	37.5	21.1	20.0	-18.5	-16.7
E2	yellow green	92.6	4.9	72.7	73.9	-22.1	-22.3	52.4	47.7
F2	orange yellow	93.4	4.7	71.8	73.1	20.3	18.9	56.6	52.4
A3	blue	92.3	4.2	34.5	35.5	11.3	8.2	-45.6	-42.9
B3	green	89.2	5.1	57.0	58.1	-32.6	-32.2	24.9	20.0
C3	red	97.0	2.2	43.5	44.0	47.6	47.2	22.3	20.2
D3	yellow	95.6	4.1	81.5	82.5	6.7	5.2	78.5	74.8
E3	magenta	92.4	4.4	54.8	55.9	47.8	45.5	-12.5	-9.0
F3	cyan	98.0	1.5	54.1	55.1	-18.8	-19.9	-28.7	-28.2
A4	white	80.6	2.4	94.6	95.0	2.2	1.1	-2.4	-0.4
B4	neutral 8	95.4	1.3	80.4	81.3	1.3	0.4	-2.0	-1.8
C4	neutral 6.5	96.2	1.3	67.2	68.2	0.7	0.0	-2.5	-2.0
D4	neutral 5	99.0	1.1	54.3	55.2	2.0	1.4	-1.3	-1.3
E4	neutral 3.5	100.0	1.1	43.0	43.9	1.9	1.4	-1.7	-1.8
F4	black	100.0	0.8	31.4	32.1	1.2	1.1	-0.7	-0.6
A5	paper white	57.2	4.6	97.6	97.8	2.0	0.5	-4.2	0.1
B5	Skin highlight L*=88	91.4	2.1	87.4	88.4	13.2	11.9	8.8	7.5
C5	Skin highlight L* =75	92.2	2.8	75.0	76.3	21.0	19.9	15.7	13.4
D5	Skin shadow L*=28	99.9	0.9	32.9	33.6	13.9	14.0	11.7	11.2
E5	Skin shadow L*=13	99.7	0.6	26.6	26.8	10.3	10.7	8.7	9.0
F5	Maximum Black	100.0	0.1	19.6	19.7	0.9	0.9	0.6	0.6

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	92.7	97.0	2.7
Worst 10% (3 lowest scoring patches)	75.2	94.3	5.0

50 Megalux hours

Epson Stylus Pro 3800, Inkjetfly IMA24/36 V3, Harman by Hahnemuhle Matte Cotton Smooth 300gsm, no additional coating



Original Print Colors before light exposure

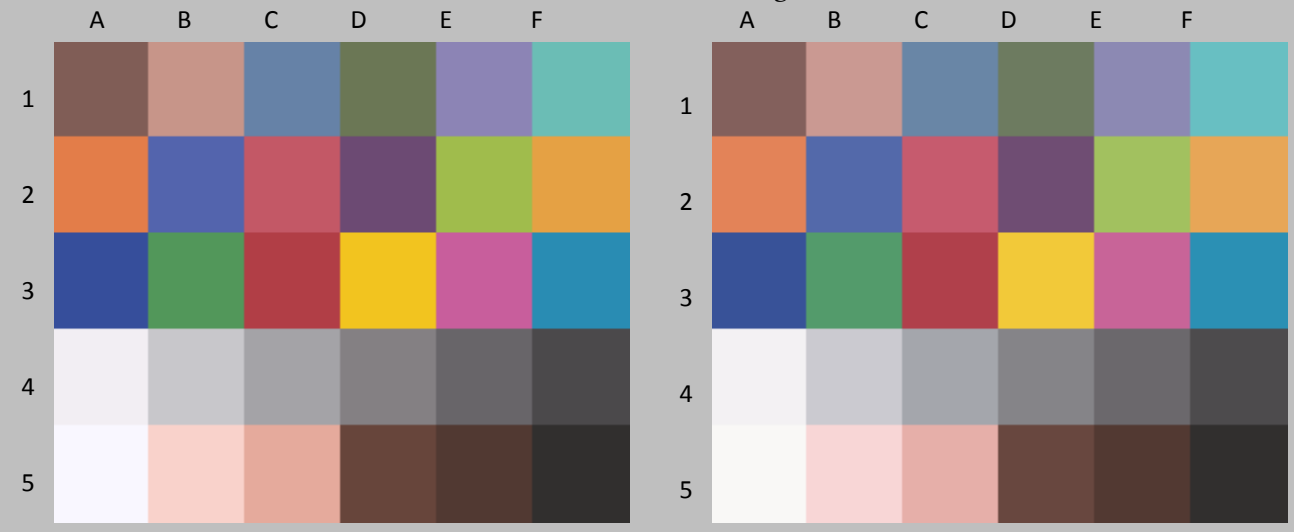
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	93.2	2.1	43.0	44.3	13.8	13.6	9.7	8.1
B1	Light Skin	89.7	3.2	66.4	67.7	18.1	17.4	14.4	11.6
C1	Blue sky	90.7	2.9	53.1	54.2	-2.5	-4.4	-23.0	-21.1
D1	Foliage	86.3	3.3	48.4	49.5	-9.3	-9.2	17.2	14.0
E1	blue flower	86.1	4.5	57.2	58.4	11.1	8.4	-25.5	-22.0
F1	bluish green	84.8	4.9	71.2	72.1	-28.0	-27.1	-3.5	-8.2
A1	orange	92.0	5.4	63.5	64.8	36.9	35.5	46.2	41.1
B2	purplish blue	88.1	5.8	43.5	44.8	9.8	6.0	-42.4	-38.2
C2	moderate red	95.4	2.9	51.6	52.7	45.4	44.9	14.0	11.4
D2	purple	93.4	2.6	36.6	37.6	21.1	19.9	-18.5	-16.4
E2	yellow green	90.6	6.0	72.7	73.9	-22.1	-22.0	52.4	46.6
F2	orange yellow	91.7	5.6	71.8	73.1	20.3	18.9	56.6	51.3
A3	blue	91.0	4.8	34.5	35.5	11.3	7.9	-45.6	-42.4
B3	green	86.8	6.0	57.0	58.2	-32.6	-32.1	24.9	19.0
C3	red	96.2	2.6	43.5	44.1	47.6	47.3	22.3	19.8
D3	yellow	94.3	5.1	81.5	82.4	6.7	5.3	78.5	73.7
E3	magenta	91.3	4.9	54.8	55.9	47.8	45.2	-12.5	-8.5
F3	cyan	97.1	1.8	54.1	55.1	-18.8	-20.1	-28.7	-27.9
A4	white	77.4	2.7	94.6	94.9	2.2	1.1	-2.4	-0.1
B4	neutral 8	95.6	1.2	80.4	81.2	1.3	0.4	-2.0	-1.8
C4	neutral 6.5	95.3	1.3	67.2	68.1	0.7	-0.1	-2.5	-2.0
D4	neutral 5	99.0	1.1	54.3	55.2	2.0	1.4	-1.3	-1.3
E4	neutral 3.5	100.0	1.0	43.0	43.9	1.9	1.5	-1.7	-1.8
F4	black	100.0	0.8	31.4	32.1	1.2	1.1	-0.7	-0.6
A5	paper white	49.8	5.3	97.6	97.6	2.0	0.5	-4.2	0.8
B5	Skin highlight L*=88	88.8	2.4	87.4	88.3	13.2	12.1	8.8	6.8
C5	Skin highlight L* =75	89.6	3.5	75.0	76.2	21.0	20.0	15.7	12.6
D5	Skin shadow L*=28	98.9	1.0	32.9	33.6	13.9	14.1	11.7	11.0
E5	Skin shadow L*=13	99.6	0.5	26.6	26.6	10.3	10.8	8.7	8.9
F5	Maximum Black	100.0	0.2	19.6	19.5	0.9	1.0	0.6	0.7

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	91.1	96.8	3.2
Worst 10% (3 lowest scoring patches)	70.7	93.8	5.9

60 Megalux hours

Epson Stylus Pro 3800, Inkjetfly IMA24/36 V3, Harman by Hahnemuhle Matte Cotton Smooth 300gsm, no additional coating



Original Print Colors before light exposure

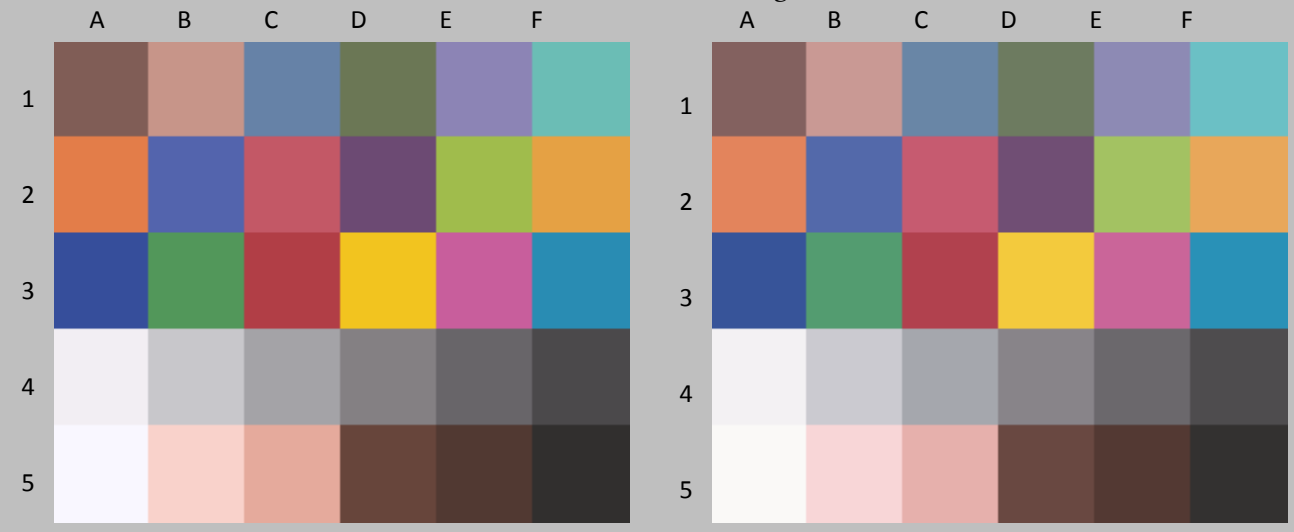
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	90.9	2.5	43.0	44.4	13.8	13.7	9.7	7.7
B1	Light Skin	85.6	4.1	66.4	67.9	18.1	17.6	14.4	10.6
C1	Blue sky	91.5	2.8	53.1	54.4	-2.5	-4.3	-23.0	-21.3
D1	Foliage	83.1	4.0	48.4	49.7	-9.3	-9.1	17.2	13.4
E1	blue flower	86.3	4.5	57.2	58.6	11.1	8.4	-25.5	-22.1
F1	bluish green	79.0	6.5	71.2	72.3	-28.0	-26.6	-3.5	-9.8
A1	orange	89.9	6.6	63.5	65.0	36.9	35.4	46.2	39.9
B2	purplish blue	87.9	6.0	43.5	45.0	9.8	5.8	-42.4	-38.2
C2	moderate red	93.8	3.6	51.6	52.8	45.4	45.0	14.0	10.6
D2	purple	93.4	2.6	36.6	37.7	21.1	19.9	-18.5	-16.5
E2	yellow green	88.1	7.4	72.7	74.2	-22.1	-22.1	52.4	45.2
F2	orange yellow	89.5	7.0	71.8	73.4	20.3	18.7	56.6	50.0
A3	blue	90.8	4.9	34.5	35.7	11.3	7.7	-45.6	-42.4
B3	green	83.8	7.3	57.0	58.5	-32.6	-32.0	24.9	17.8
C3	red	95.0	3.2	43.5	44.1	47.6	47.4	22.3	19.2
D3	yellow	92.7	6.4	81.5	82.8	6.7	5.0	78.5	72.5
E3	magenta	91.7	4.8	54.8	56.1	47.8	45.2	-12.5	-8.7
F3	cyan	98.1	1.6	54.1	55.3	-18.8	-19.9	-28.7	-28.4
A4	white	85.5	2.0	94.6	95.1	2.2	1.1	-2.4	-0.9
B4	neutral 8	93.9	1.6	80.4	81.6	1.3	0.7	-2.0	-2.9
C4	neutral 6.5	98.3	1.3	67.2	68.4	0.7	0.1	-2.5	-2.6
D4	neutral 5	98.3	1.3	54.3	55.4	2.0	1.5	-1.3	-1.7
E4	neutral 3.5	100.0	1.3	43.0	44.2	1.9	1.5	-1.7	-2.0
F4	black	100.0	0.9	31.4	32.3	1.2	1.1	-0.7	-0.7
A5	paper white	51.7	5.1	97.6	97.8	2.0	0.3	-4.2	0.6
B5	Skin highlight L*=88	79.0	4.0	87.4	88.6	13.2	12.2	8.8	5.1
C5	Skin highlight L* =75	84.3	4.9	75.0	76.5	21.0	20.1	15.7	11.2
D5	Skin shadow L*=28	97.4	1.3	32.9	33.7	13.9	14.2	11.7	10.8
E5	Skin shadow L*=13	98.4	0.7	26.6	26.7	10.3	10.8	8.7	9.1
F5	Maximum Black	100.0	0.2	19.6	19.6	0.9	1.0	0.6	0.8

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	89.9	96.3	3.7
Worst 10% (3 lowest scoring patches)	69.9	93.1	7.2

70 Megalux hours

Epson Stylus Pro 3800, Inkjetfly IMA24/36 V3, Harman by Hahnemuhle Matte Cotton Smooth 300gsm, no additional coating



Original Print Colors before light exposure

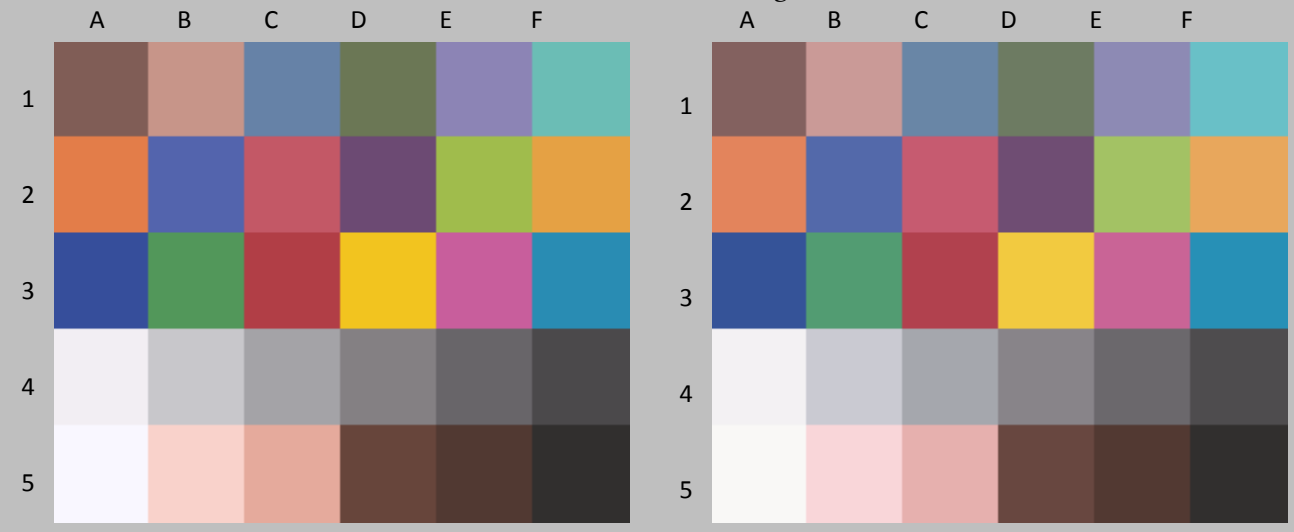
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	88.3	3.0	43.0	44.6	13.8	13.6	9.7	7.3
B1	Light Skin	81.8	5.0	66.4	68.0	18.1	17.7	14.4	9.7
C1	Blue sky	91.4	2.9	53.1	54.6	-2.5	-4.3	-23.0	-21.3
D1	Foliage	79.0	4.8	48.4	49.9	-9.3	-8.9	17.2	12.6
E1	blue flower	85.8	4.7	57.2	58.8	11.1	8.3	-25.5	-22.0
F1	bluish green	73.8	8.0	71.2	72.5	-28.0	-26.0	-3.5	-11.1
A1	orange	87.5	8.1	63.5	65.2	36.9	35.3	46.2	38.4
B2	purplish blue	87.1	6.3	43.5	45.2	9.8	5.8	-42.4	-37.8
C2	moderate red	92.4	4.4	51.6	53.1	45.4	44.9	14.0	9.9
D2	purple	92.3	3.0	36.6	38.1	21.1	19.7	-18.5	-16.2
E2	yellow green	85.6	8.9	72.7	74.5	-22.1	-22.0	52.4	43.8
F2	orange yellow	87.2	8.4	71.8	73.6	20.3	18.6	56.6	48.6
A3	blue	89.7	5.6	34.5	36.1	11.3	7.5	-45.6	-41.8
B3	green	80.4	8.7	57.0	58.8	-32.6	-31.6	24.9	16.4
C3	red	93.5	4.0	43.5	44.4	47.6	47.1	22.3	18.4
D3	yellow	90.7	8.0	81.5	83.0	6.7	4.8	78.5	70.9
E3	magenta	91.2	5.1	54.8	56.3	47.8	45.1	-12.5	-8.5
F3	cyan	99.1	1.6	54.1	55.5	-18.8	-19.6	-28.7	-28.5
A4	white	89.0	1.7	94.6	95.2	2.2	1.3	-2.4	-1.2
B4	neutral 8	89.2	2.0	80.4	81.7	1.3	0.8	-2.0	-3.5
C4	neutral 6.5	97.8	1.5	67.2	68.5	0.7	0.2	-2.5	-2.9
D4	neutral 5	98.1	1.5	54.3	55.7	2.0	1.6	-1.3	-1.9
E4	neutral 3.5	99.7	1.6	43.0	44.4	1.9	1.5	-1.7	-2.2
F4	black	100.0	1.4	31.4	32.7	1.2	1.1	-0.7	-0.6
A5	paper white	50.9	5.2	97.6	98.0	2.0	0.3	-4.2	0.7
B5	Skin highlight L*=88	71.4	5.2	87.4	88.8	13.2	12.5	8.8	3.8
C5	Skin highlight L* =75	80.0	6.0	75.0	76.8	21.0	20.2	15.7	10.0
D5	Skin shadow L*=28	95.3	1.9	32.9	34.2	13.9	14.0	11.7	10.3
E5	Skin shadow L*=13	99.8	0.8	26.6	27.1	10.3	10.8	8.7	8.9
F5	Maximum Black	100.0	0.7	19.6	20.3	0.9	1.0	0.6	0.7

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	88.3	96.0	4.3
Worst 10% (3 lowest scoring patches)	65.4	92.5	8.7

80 Megalux hours

Epson Stylus Pro 3800, Inkjetfly IMA24/36 V3, Harman by Hahnemuhle Matte Cotton Smooth 300gsm, no additional coating



Original Print Colors before light exposure

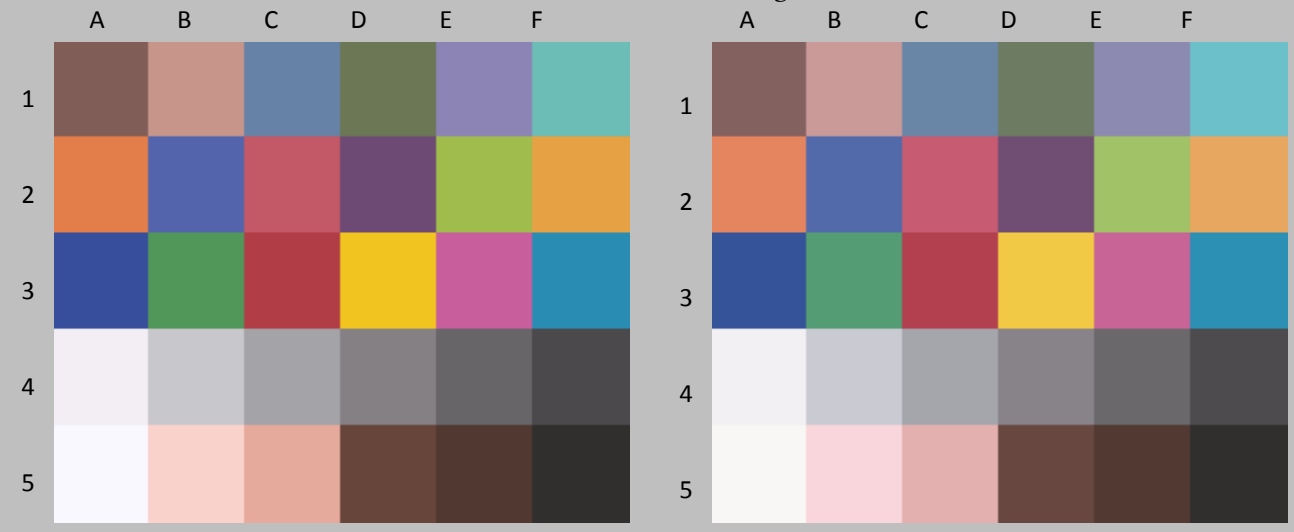
Colors After light exposure

				L*		a*		b*	
Patch #	Description	I* Color	ΔE	Before	After	Before	After	Before	After
A1	Dark Skin	86.8	3.1	43.0	44.5	13.8	13.8	9.7	7.0
B1	Light Skin	79.7	5.5	66.4	68.1	18.1	17.8	14.4	9.2
C1	Blue sky	91.6	2.8	53.1	54.5	-2.5	-4.3	-23.0	-21.4
D1	Foliage	77.1	5.2	48.4	49.8	-9.3	-8.8	17.2	12.3
E1	blue flower	85.8	4.7	57.2	58.7	11.1	8.3	-25.5	-22.0
F1	bluish green	70.1	9.0	71.2	72.4	-28.0	-25.8	-3.5	-12.2
A1	orange	86.3	8.7	63.5	65.2	36.9	35.4	46.2	37.7
B2	purplish blue	87.1	6.3	43.5	45.0	9.8	5.7	-42.4	-37.8
C2	moderate red	91.9	4.6	51.6	53.0	45.4	45.1	14.0	9.6
D2	purple	92.9	2.8	36.6	37.8	21.1	19.8	-18.5	-16.3
E2	yellow green	83.8	9.9	72.7	74.6	-22.1	-22.0	52.4	42.7
F2	orange yellow	85.7	9.3	71.8	73.6	20.3	18.6	56.6	47.7
A3	blue	90.0	5.4	34.5	35.7	11.3	7.4	-45.6	-42.1
B3	green	78.0	9.7	57.0	58.8	-32.6	-31.5	24.9	15.4
C3	red	93.2	4.2	43.5	44.3	47.6	47.4	22.3	18.2
D3	yellow	89.6	8.8	81.5	83.0	6.7	4.7	78.5	70.0
E3	magenta	91.2	5.1	54.8	56.2	47.8	45.2	-12.5	-8.5
F3	cyan	99.2	1.5	54.1	55.4	-18.8	-19.6	-28.7	-28.8
A4	white	89.9	1.6	94.6	95.2	2.2	1.3	-2.4	-1.3
B4	neutral 8	85.1	2.3	80.4	81.7	1.3	0.9	-2.0	-3.9
C4	neutral 6.5	97.3	1.5	67.2	68.5	0.7	0.2	-2.5	-3.1
D4	neutral 5	97.1	1.5	54.3	55.6	2.0	1.6	-1.3	-2.0
E4	neutral 3.5	98.4	1.5	43.0	44.3	1.9	1.6	-1.7	-2.3
F4	black	100.0	1.0	31.4	32.4	1.2	1.1	-0.7	-0.7
A5	paper white	50.2	5.2	97.6	97.8	2.0	0.3	-4.2	0.7
B5	Skin highlight L*=88	66.2	6.0	87.4	88.8	13.2	12.6	8.8	3.0
C5	Skin highlight L* =75	76.9	6.8	75.0	76.8	21.0	20.3	15.7	9.2
D5	Skin shadow L*=28	95.4	1.7	32.9	33.9	13.9	14.3	11.7	10.4
E5	Skin shadow L*=13	96.4	1.0	26.6	26.8	10.3	11.2	8.7	9.1
F5	Maximum Black	100.0	0.2	19.6	19.6	0.9	1.0	0.6	0.8

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	87.1	95.6	4.6
Worst 10% (3 lowest scoring patches)	62.2	91.7	9.6

90 Megalux hours

Epson Stylus Pro 3800, Inkjetfly IMA24/36 V3, Harman by Hahnemuhle Matte Cotton Smooth 300gsm, no additional coating



Original Print Colors before light exposure

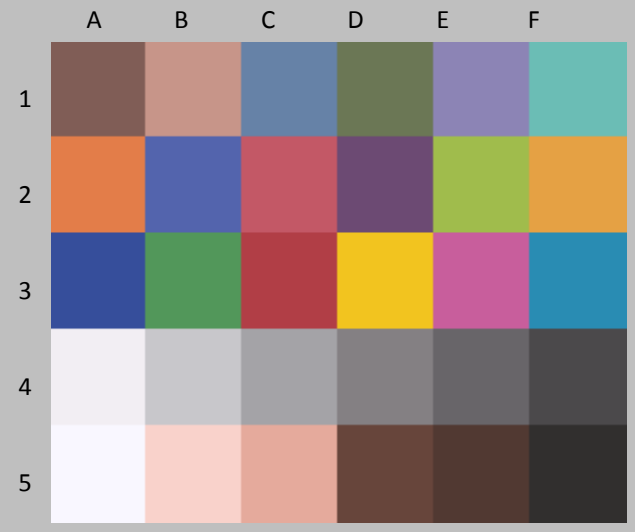
Colors After light exposure

				L*		a*		b*	
Patch #	Description	I* Color	ΔE	Before	After	Before	After	Before	After
A1	Dark Skin	85.3	3.4	43.0	44.7	13.8	13.8	9.7	6.8
B1	Light Skin	76.4	6.2	66.4	68.1	18.1	17.9	14.4	8.4
C1	Blue sky	90.5	3.0	53.1	54.6	-2.5	-4.4	-23.0	-21.1
D1	Foliage	74.2	5.8	48.4	49.9	-9.3	-8.7	17.2	11.7
E1	blue flower	84.0	5.2	57.2	58.8	11.1	8.2	-25.5	-21.5
F1	bluish green	66.6	10.0	71.2	72.5	-28.0	-25.3	-3.5	-13.1
A1	orange	84.2	10.0	63.5	65.3	36.9	35.4	46.2	36.4
B2	purplish blue	85.7	6.9	43.5	45.1	9.8	5.4	-42.4	-37.2
C2	moderate red	91.1	5.0	51.6	53.0	45.4	45.1	14.0	9.2
D2	purple	92.0	3.1	36.6	37.9	21.1	19.8	-18.5	-16.1
E2	yellow green	80.9	11.5	72.7	74.6	-22.1	-21.7	52.4	41.1
F2	orange yellow	83.3	10.7	71.8	73.6	20.3	18.8	56.6	46.2
A3	blue	88.9	5.9	34.5	35.8	11.3	7.2	-45.6	-41.6
B3	green	75.1	10.9	57.0	58.8	-32.6	-31.1	24.9	14.3
C3	red	92.3	4.6	43.5	44.3	47.6	47.5	22.3	17.7
D3	yellow	87.6	10.4	81.5	82.9	6.7	4.8	78.5	68.4
E3	magenta	90.3	5.5	54.8	56.2	47.8	44.8	-12.5	-8.2
F3	cyan	98.6	1.6	54.1	55.3	-18.8	-19.8	-28.7	-28.4
A4	white	85.7	1.9	94.6	95.0	2.2	1.2	-2.4	-0.9
B4	neutral 8	84.8	2.3	80.4	81.6	1.3	1.0	-2.0	-4.0
C4	neutral 6.5	97.3	1.4	67.2	68.4	0.7	0.2	-2.5	-3.1
D4	neutral 5	95.7	1.5	54.3	55.4	2.0	1.6	-1.3	-2.1
E4	neutral 3.5	98.5	1.4	43.0	44.2	1.9	1.6	-1.7	-2.3
F4	black	100.0	0.9	31.4	32.3	1.2	1.1	-0.7	-0.8
A5	paper white	43.8	5.8	97.6	97.4	2.0	0.2	-4.2	1.4
B5	Skin highlight L*=88	62.7	6.5	87.4	88.5	13.2	12.8	8.8	2.4
C5	Skin highlight L* =75	73.0	7.7	75.0	76.6	21.0	20.4	15.7	8.1
D5	Skin shadow L*=28	93.2	2.0	32.9	33.8	13.9	14.3	11.7	10.0
E5	Skin shadow L*=13	96.2	1.0	26.6	26.5	10.3	11.2	8.7	9.0
F5	Maximum Black	100.0	0.2	19.6	19.6	0.9	1.0	0.6	0.7

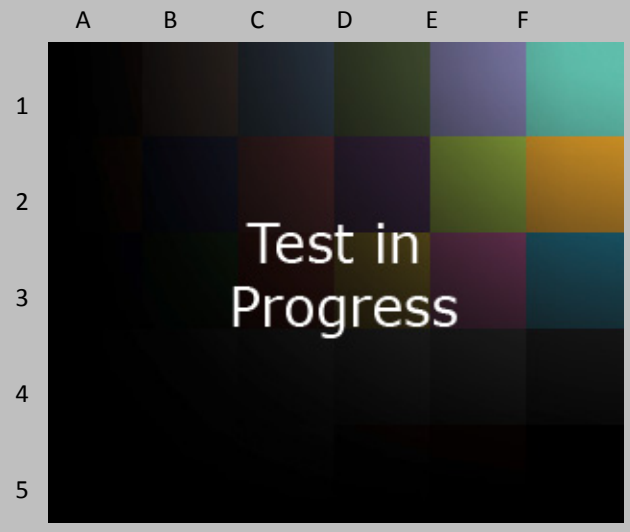
Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	85.3	95.4	5.1
Worst 10% (3 lowest scoring patches)	57.7	90.6	11.0

100 Megalux hours

The 120 Megalux hour Update will be posted on approximately JAN 05, 2015.



Original Print Colors before light exposure



Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin			43.0		13.8		9.7	
B1	Light Skin			66.4		18.1		14.4	
C1	Blue sky			53.1		-2.5		-23.0	
D1	Foliage			48.4		-9.3		17.2	
E1	blue flower			57.2		11.1		-25.5	
F1	bluish green			71.2		-28.0		-3.5	
A1	orange			63.5		36.9		46.2	
B2	purplish blue			43.5		9.8		-42.4	
C2	moderate red			51.6		45.4		14.0	
D2	purple			36.6		21.1		-18.5	
E2	yellow green			72.7		-22.1		52.4	
F2	orange yellow			71.8		20.3		56.6	
A3	blue			34.5		11.3		-45.6	
B3	green			57.0		-32.6		24.9	
C3	red			43.5		47.6		22.3	
D3	yellow			81.5		6.7		78.5	
E3	magenta			54.8		47.8		-12.5	
F3	cyan			54.1		-18.8		-28.7	
A4	white			94.6		2.2		-2.4	
B4	neutral 8			80.4		1.3		-2.0	
C4	neutral 6.5			67.2		0.7		-2.5	
D4	neutral 5			54.3		2.0		-1.3	
E4	neutral 3.5			43.0		1.9		-1.7	
F4	black			31.4		1.2		-0.7	
A5	paper white			97.6		2.0		-4.2	
B5	Skin highlight L*=88			87.4		13.2		8.8	
C5	Skin highlight L* =75			75.0		21.0		15.7	
D5	Skin shadow L*=28			32.9		13.9		11.7	
E5	Skin shadow L*=13			26.6		10.3		8.7	
F5	Maximum Black			19.6		0.9		0.6	

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches			
Worst 10% (3 lowest scoring patches)			

120 Megalux hours