Aardenburg
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IMAGING & ARCHIVES

Tested System:
ID#:315

Printer: Epson Stylus Pro 3880

Inks/Colorants: Epson OEM UltraChrome K3 with Vivid Magenta

Media: Hahnemuhle Photo Rag Pearl 320gsm

Coating(s): no additional coating

Sample #: AaI_20150503_SN006

Testing Status: 200 Megalux hours total light exposure

Testing is complete - there are no more updates

Conservation Display Rating (CDR)

Lower limit: 59 Megalux hours (for weakest 10% of the color patches)
Upper limit: 83 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"**,

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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.



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

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

Table to Convert Megalux-hours of Light Exposure to estimated "Years on Display" Light Fastness Ratings.											
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	**11.42**	**114**	**228**	**342**	**457**	**571**	**685**	**799**	**913**	**1027**	**1142**
50 Lux 12 hours per day	"Museum Standard" display condition	**4.57**	**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).	**1.90**	**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.	**1.00**	**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.	**0.51**	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**41**	**46**	**51**
2000 Lux 12 hours per day	Commercial Gallery. Also, critical color evaluation standards call for 2000 lux and a D50 illumination source.	**0.114**	**1.1**	**2.3**	**3.4**	**4.6**	**5.7**	**6.8**	**8.0**	**9.1**	**10.3**	**11.4**
5000 Lux 12 hours per day	E.g., Sunlight through a window striking print at an angle.	**0.046**	**0.5**	**0.9**	**1.4**	**1.8**	**2.3**	**2.7**	**3.2**	**3.7**	**4.1**	**4.6**
10,000 Lux 12 hours per day	South-facing window in U.S.A. , e.g., storefront display with photos directly facing window.	**0.023**	**0.2**	**0.5**	**0.7**	**0.9**	**1.1**	**1.4**	**1.6**	**1.8**	**2.1**	**2.3**

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 an equivalent light exposure 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 "Light Exposure" 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 strong seasonal humidity fluctuations can cause physical cracks and/or flaking, etc., over time. Handling damage such as scratching, abrasion, tears and creases, and catastrophic damage by smoke, fire, flood, etc., also destroy print quality over time. Thus, as illumination levels are reduced other forms of print degradation take on greater probability of occurrence.

(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. However, for light fading claims regarding its 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 dosage, at an assumed 75˚F/60%RH temperature and humidity level, has become a de facto industry standard for most industry-sponsored predictive "years of life" light fading estimates in the absence of a published International Standards Organization (ISO) test standard. The table above readily shows how much error occurs in such "print lifetime" predictions as actual real world light levels for prints on display routinely deviate above and below the assumed 450 lux intensity value.

Sample Description

Sample #	**AaI_20150503_SN006**	**Batch #:**	N1
Printer:	Epson Stylus Pro 3880		
Ink:	Epson OEM UltraChrome K3 with Vivid Magenta		
Media:	Hahnemuhle Photo Rag Pearl 320gsm		
Coating(s):	no additional coating		
Test Print Prepared by:	AaI&A		
Printed:	May 3, 2015		
Initial Print colors measured	May 13, 2015		
Test Started:	May 13, 2015		
Test Image:	AaI_StandardColorSet(v2)forSRGB.tif		
RIP?Driver settings:	2880 dpi, HS off, finest detail, 16 bit		
Media Setting	Ultra Premium Luster		
Profile:	AaI_Ep3880_HNPhRagPearl_1.icc	**Rendering**	perceptual
Profile type:	custom		

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

Optical Brighteners Present? *no*	**L***		**a***		**b***	
Media Whitepoint Color	UV inc	UV exc	UV inc	UV exc	UV inc	UV exc
	97.4	97.7	0.4	0.4	1.4	1.5
	UV-inc/UV-exc ΔL*, Δa*, Δb* respectively					
	0.3		0.0		0.1	
	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)		
	12.0	0.0	0.1	1.85		

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:	10640 Lux
Average Temperature:	24.3˚C over full test duration, 25.1˚C during light exposure.
Average Relative humidity:	57.6%RH over full test duration, 56.9%RH during light exposure.

Compare this sample to sample # AaI_20150503_SN005 (ID# 314 in the AaI&A database) which is printed with the older Epson Ultrachrome K3VM ink set on the same paper batch and run side-by-side in test.

Conclusions:

This sample is part of Batch N in the Aardenburg light fade test results database. Batch N contains six printer/ink/media combinations intended to look at differences in the newer Epson UltraChrome HD ink set versus the older Epson K3 ink set as well as the Canon Lucia EX ink set on two media, Epson WaterColor Paper Textured 320gsm and Hahnemuhle Photo Rag Pearl 320gsm. To find all six test reports easily in the Aardenburg test results database, filter the database for [batch] = "N".

The 200 Megalux hour test cycle is now complete, and the Conservation Display ratings are as follows:

Epson K3 ink:

Hahnemuhle Photo Rag Pearl…….. 59-83 Megalux hours
Epson WaterColor Paper Textured…….. 55-82 Megalux hours

Epson HD ink:

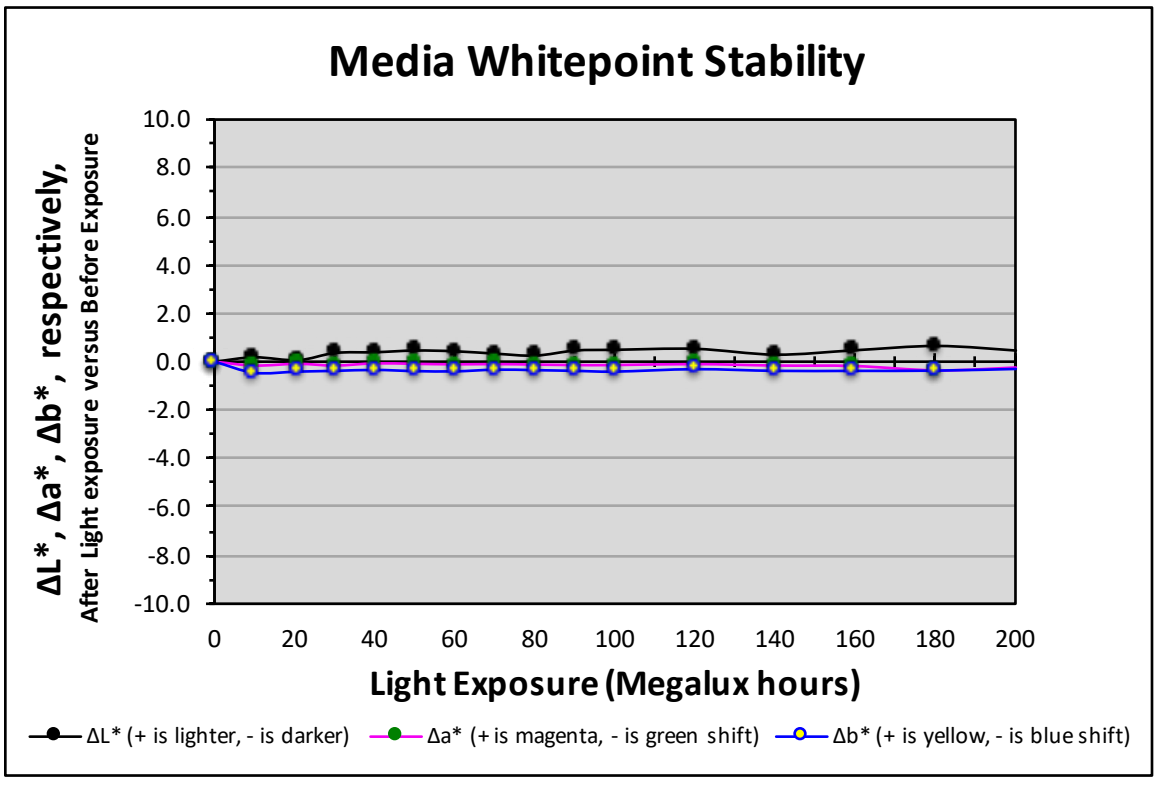
Hahnemuhle Photo Rag Pearl…….. 99-124 Megalux hours
Epson WaterColor Paper Textured…….. 123-154 Megalux hours

Canon Lucia EX ink:

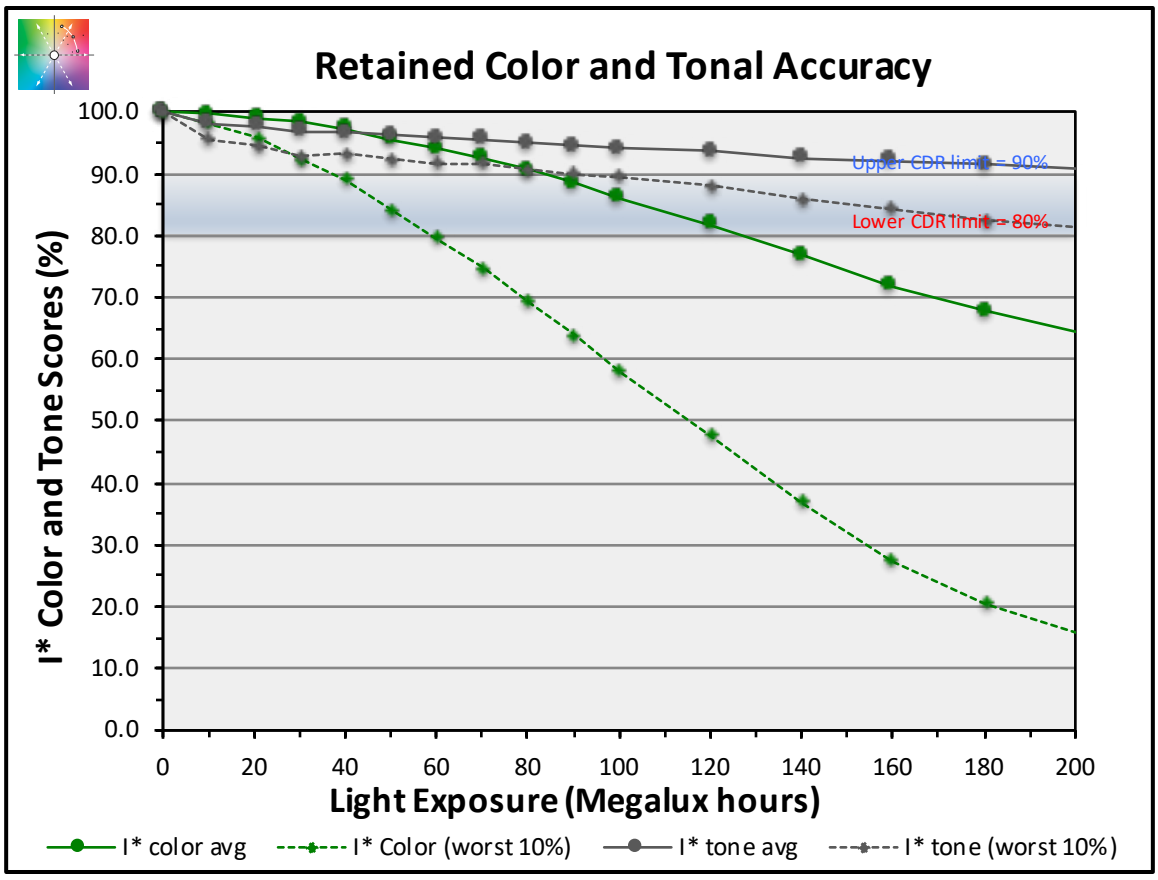
Hahnemuhle Photo Rag Pearl…….. 118-165 Megalux hours
Epson WaterColor Paper Textured…….. 109-200+ Megalux hours

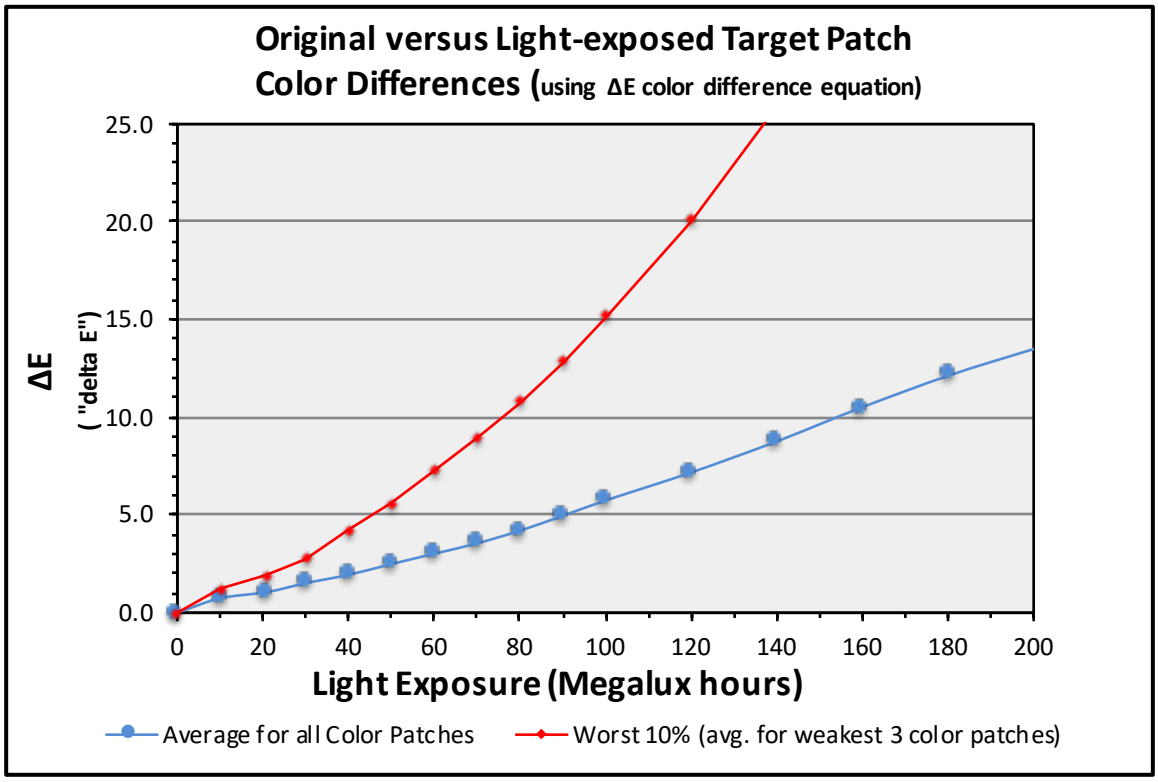
Epson's newer HD ink set clearly outperformed the older K3 set in the early stages of fading where little or no noticeable fade takes place (i.e., the basis for the Conservation Display ratings). However, once the fading reached a point where it becomes more noticeable, the HD ink set began to show a significantly faster fading rate. Compare the graphs on page 6 in each of the six test printer/ink/media combinations to evaluate the nonlinearity in the fading curves. The Canon Lucia EX ink set exhibited a more linear response over the full 200 Mluxhr cycle which enabled it to achieve superior overall fade resistance with respect to the two media types tested.

Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



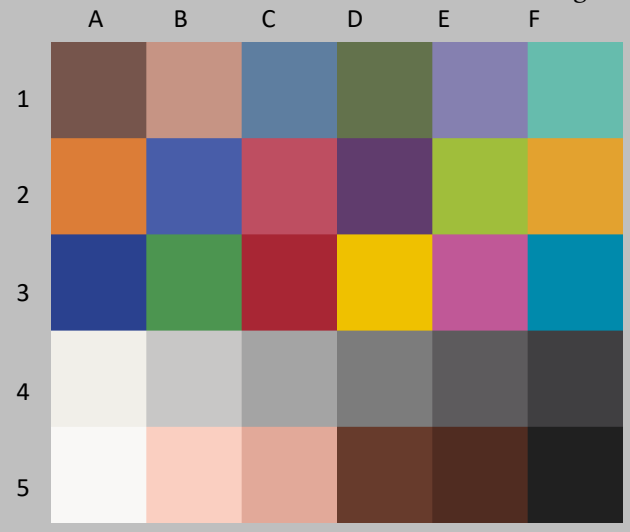
Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



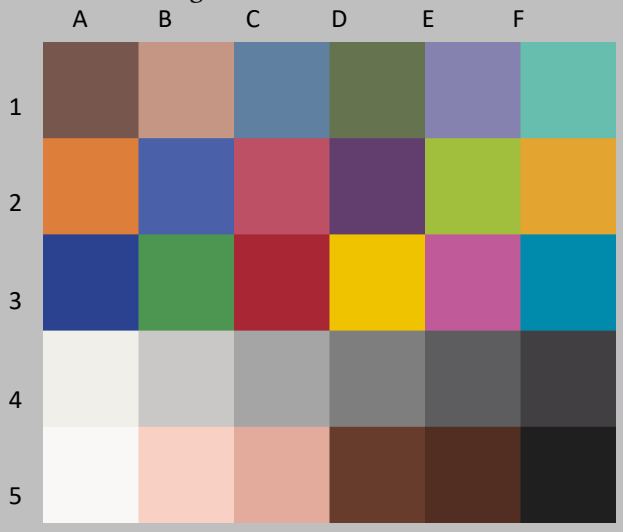


Values:

Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



Original Print Colors before light exposure



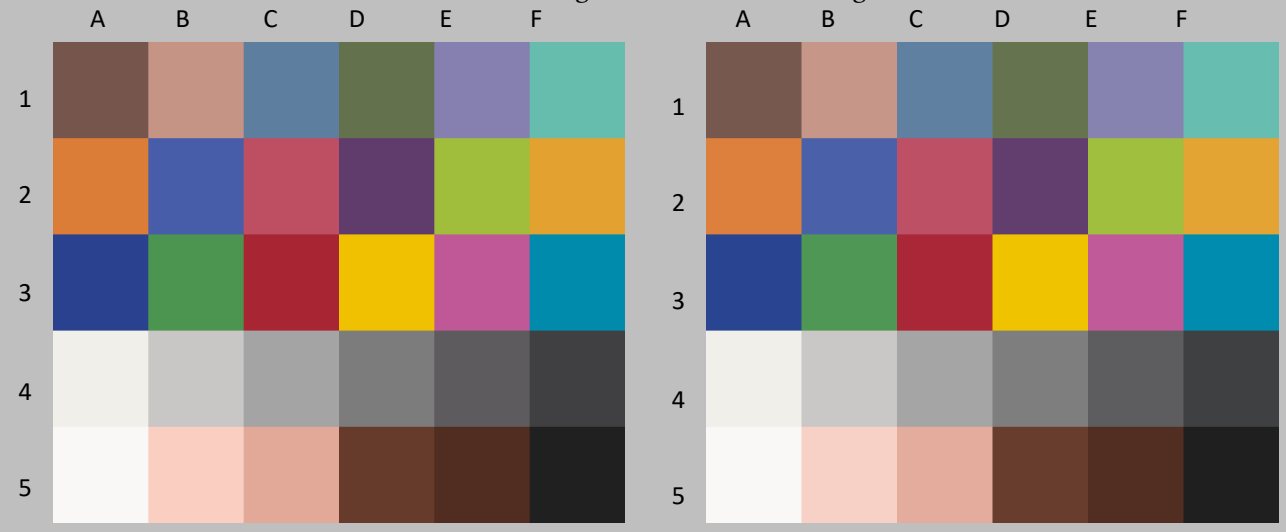
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	100.0	0.7	39.5	40.2	12.8	12.6	11.5	11.4
B1	Light Skin	98.7	1.0	65.8	66.4	17.5	16.8	16.0	15.6
C1	Blue sky	99.8	0.9	51.4	52.1	-4.7	-5.2	-21.9	-21.8
D1	Foliage	100.0	0.6	46.0	46.5	-11.0	-11.2	19.1	19.1
E1	blue flower	98.4	1.2	55.3	56.1	10.0	9.2	-24.8	-24.3
F1	bluish green	100.0	0.5	70.6	71.0	-30.0	-30.1	-1.1	-1.4
A1	orange	99.1	1.1	62.5	62.9	34.4	33.6	52.6	52.0
B2	purplish blue	98.9	1.3	40.7	41.5	9.6	8.7	-43.8	-43.4
C2	moderate red	99.5	0.9	49.0	49.5	46.7	46.2	12.9	12.3
D2	purple	100.0	0.7	31.5	32.2	22.8	22.6	-21.8	-21.7
E2	yellow green	100.0	0.6	72.9	73.3	-23.7	-24.0	59.4	59.1
F2	orange yellow	99.2	1.1	71.8	72.1	18.4	17.5	65.1	64.5
A3	blue	99.2	1.0	29.3	29.9	13.4	12.5	-47.4	-47.2
B3	green	100.0	0.7	55.7	56.3	-35.3	-35.5	29.5	29.0
C3	red	100.0	0.2	38.6	38.8	52.8	52.8	25.8	25.7
D3	yellow	99.7	0.9	80.5	80.8	5.7	4.9	94.6	94.9
E3	magenta	99.5	0.9	52.5	53.0	47.7	47.0	-13.9	-14.0
F3	cyan	100.0	0.7	51.7	52.2	-29.0	-29.3	-29.2	-29.2
A4	white	100.0	0.5	94.5	94.6	0.2	-0.1	3.1	2.7
B4	neutral 8	100.0	0.5	80.5	80.9	-0.1	-0.4	1.2	1.0
C4	neutral 6.5	100.0	0.6	67.5	67.9	0.3	0.0	0.2	0.1
D4	neutral 5	100.0	0.7	52.3	52.9	0.5	0.1	-0.2	-0.2
E4	neutral 3.5	100.0	0.6	39.0	39.5	0.6	0.4	-1.2	-1.2
F4	black	100.0	0.5	26.5	27.1	0.7	0.5	-1.0	-1.0
A5	paper white	100.0	0.5	97.6	97.8	0.5	0.3	1.4	0.9
B5	Skin highlight L*=88	97.4	1.0	86.8	87.1	13.6	13.0	12.8	12.0
C5	Skin highlight L* =75	98.5	1.0	74.6	75.1	19.5	18.8	16.8	16.3
D5	Skin shadow L*=28	100.0	0.6	30.2	30.7	19.1	18.9	17.7	18.0
E5	Skin shadow L*=13	100.0	0.4	22.7	23.0	15.6	15.7	15.0	15.3
F5	Maximum Black	100.0	0.3	12.0	11.8	0.0	-0.1	0.1	0.2

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	99.6	98.1	0.7
Worst 10% (3 lowest scoring patches)	98.1	95.5	1.2

10 Megalux hours

Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



Original Print Colors before light exposure

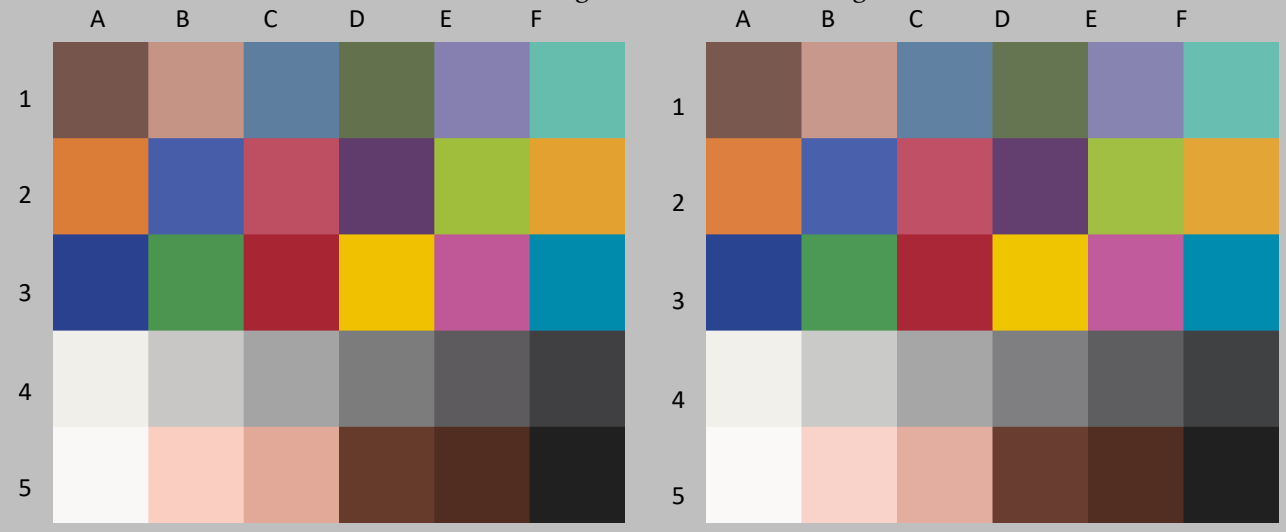
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	98.9	1.2	39.5	40.5	12.8	12.5	11.5	10.9
B1	Light Skin	96.6	1.5	65.8	66.6	17.5	16.8	16.0	14.9
C1	Blue sky	99.6	1.1	51.4	52.3	-4.7	-5.3	-21.9	-21.7
D1	Foliage	100.0	0.9	46.0	46.7	-11.0	-11.2	19.1	18.7
E1	blue flower	98.6	1.3	55.3	56.3	10.0	9.2	-24.8	-24.4
F1	bluish green	98.8	1.0	70.6	71.1	-30.0	-30.0	-1.1	-1.9
A1	orange	97.5	2.1	62.5	63.0	34.4	33.4	52.6	50.8
B2	purplish blue	98.8	1.4	40.7	41.6	9.6	8.7	-43.8	-43.4
C2	moderate red	98.1	1.5	49.0	49.5	46.7	46.3	12.9	11.5
D2	purple	100.0	0.8	31.5	32.3	22.8	22.6	-21.8	-21.8
E2	yellow green	98.5	1.6	72.9	73.4	-23.7	-24.1	59.4	58.0
F2	orange yellow	98.0	1.9	71.8	72.3	18.4	17.2	65.1	63.6
A3	blue	98.7	1.4	29.3	30.0	13.4	12.3	-47.4	-47.0
B3	green	98.6	1.3	55.7	56.3	-35.3	-35.5	29.5	28.3
C3	red	99.9	0.6	38.6	38.8	52.8	53.0	25.8	25.2
D3	yellow	99.3	1.2	80.5	80.9	5.7	4.5	94.6	94.7
E3	magenta	99.3	1.0	52.5	53.0	47.7	47.0	-13.9	-14.3
F3	cyan	100.0	0.8	51.7	52.4	-29.0	-29.2	-29.2	-29.0
A4	white	100.0	0.5	94.5	94.5	0.2	-0.1	3.1	2.7
B4	neutral 8	100.0	0.5	80.5	80.9	-0.1	-0.4	1.2	1.1
C4	neutral 6.5	100.0	0.6	67.5	68.0	0.3	0.0	0.2	0.1
D4	neutral 5	100.0	0.8	52.3	53.0	0.5	0.2	-0.2	-0.3
E4	neutral 3.5	100.0	0.8	39.0	39.7	0.6	0.4	-1.2	-1.3
F4	black	100.0	0.7	26.5	27.2	0.7	0.5	-1.0	-0.8
A5	paper white	100.0	0.4	97.6	97.6	0.5	0.4	1.4	1.0
B5	Skin highlight L*=88	94.3	1.6	86.8	87.1	13.6	13.0	12.8	11.3
C5	Skin highlight L* =75	96.2	1.6	74.6	75.2	19.5	18.7	16.8	15.6
D5	Skin shadow L*=28	100.0	0.7	30.2	30.9	19.1	19.0	17.7	17.7
E5	Skin shadow L*=13	100.0	0.6	22.7	23.1	15.6	15.7	15.0	15.4
F5	Maximum Black	100.0	0.2	12.0	11.9	0.0	0.0	0.1	0.2

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	99.0	97.6	1.1
Worst 10% (3 lowest scoring patches)	95.7	94.5	1.9

20 Megalux hours

Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



Original Print Colors before light exposure

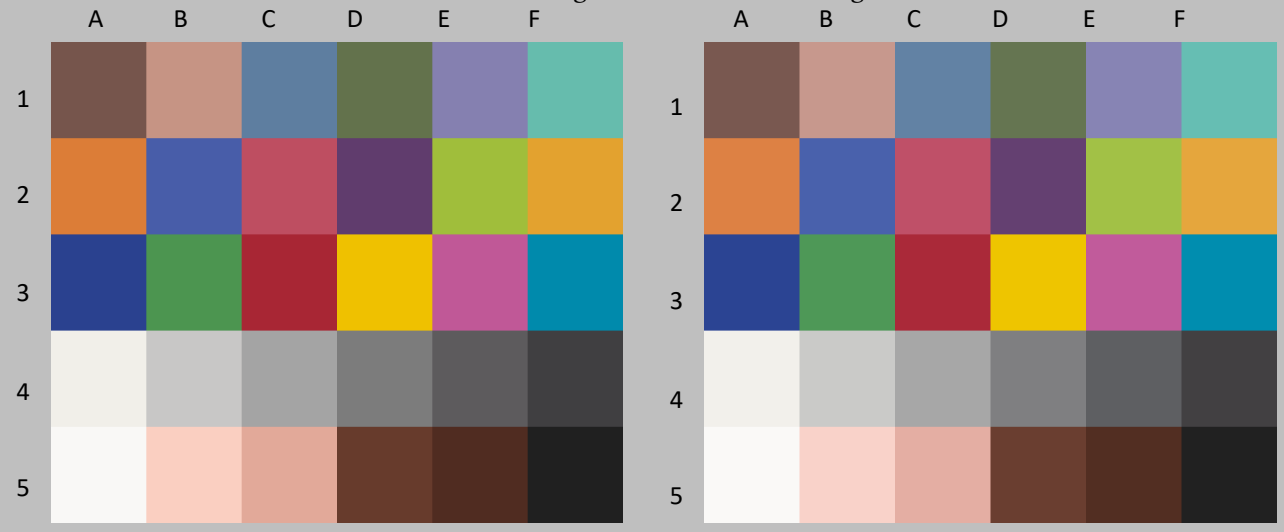
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	97.0	1.5	39.5	40.6	12.8	12.6	11.5	10.5
B1	Light Skin	94.1	2.2	65.8	66.9	17.5	16.7	16.0	14.2
C1	Blue sky	99.7	1.4	51.4	52.7	-4.7	-5.3	-21.9	-21.8
D1	Foliage	98.6	1.3	46.0	47.0	-11.0	-11.2	19.1	18.4
E1	blue flower	98.5	1.7	55.3	56.8	10.0	9.2	-24.8	-24.4
F1	bluish green	97.4	1.5	70.6	71.4	-30.0	-30.0	-1.1	-2.3
A1	orange	96.2	3.0	62.5	63.3	34.4	33.2	52.6	50.0
B2	purplish blue	99.0	1.7	40.7	42.1	9.6	8.7	-43.8	-43.5
C2	moderate red	96.5	2.3	49.0	49.8	46.7	46.5	12.9	10.7
D2	purple	100.0	1.1	31.5	32.6	22.8	22.7	-21.8	-22.1
E2	yellow green	97.3	2.4	72.9	73.9	-23.7	-24.3	59.4	57.3
F2	orange yellow	96.7	2.9	71.8	72.6	18.4	16.9	65.1	62.7
A3	blue	98.3	1.6	29.3	30.2	13.4	12.1	-47.4	-47.0
B3	green	97.5	1.9	55.7	56.7	-35.3	-35.6	29.5	27.8
C3	red	98.9	1.2	38.6	39.0	52.8	53.2	25.8	24.7
D3	yellow	98.8	1.8	80.5	81.3	5.7	4.0	94.6	94.8
E3	magenta	98.9	1.3	52.5	53.3	47.7	47.1	-13.9	-14.8
F3	cyan	100.0	1.0	51.7	52.7	-29.0	-29.3	-29.2	-29.0
A4	white	99.9	0.6	94.5	94.9	0.2	-0.1	3.1	2.7
B4	neutral 8	100.0	0.8	80.5	81.2	-0.1	-0.4	1.2	1.1
C4	neutral 6.5	100.0	1.0	67.5	68.4	0.3	0.0	0.2	0.0
D4	neutral 5	100.0	1.3	52.3	53.5	0.5	0.2	-0.2	-0.6
E4	neutral 3.5	100.0	1.1	39.0	40.1	0.6	0.4	-1.2	-1.4
F4	black	100.0	1.0	26.5	27.5	0.7	0.5	-1.0	-0.8
A5	paper white	100.0	0.5	97.6	97.9	0.5	0.3	1.4	1.0
B5	Skin highlight L*=88	89.5	2.5	86.8	87.5	13.6	12.9	12.8	10.4
C5	Skin highlight L* =75	93.5	2.4	74.6	75.7	19.5	18.6	16.8	14.8
D5	Skin shadow L*=28	100.0	1.0	30.2	31.2	19.1	19.1	17.7	17.4
E5	Skin shadow L*=13	100.0	0.9	22.7	23.4	15.6	15.8	15.0	15.4
F5	Maximum Black	100.0	0.4	12.0	12.2	0.0	-0.1	0.1	0.4

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	98.2	96.8	1.5
Worst 10% (3 lowest scoring patches)	92.4	92.6	2.8

30 Megalux hours

Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



Original Print Colors before light exposure

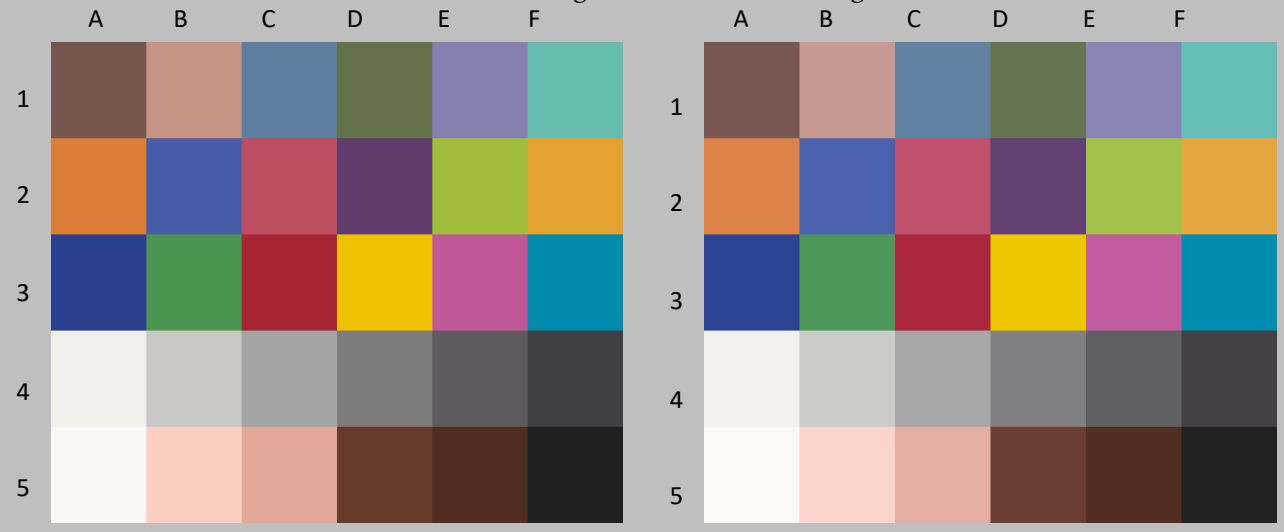
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	93.7	2.1	39.5	40.8	12.8	12.7	11.5	9.9
B1	Light Skin	90.5	3.0	65.8	67.1	17.5	16.9	16.0	13.3
C1	Blue sky	100.0	1.6	51.4	52.9	-4.7	-5.1	-21.9	-21.8
D1	Foliage	97.1	1.5	46.0	47.0	-11.0	-11.2	19.1	18.0
E1	blue flower	99.0	1.7	55.3	56.9	10.0	9.2	-24.8	-24.6
F1	bluish green	95.2	2.2	70.6	71.5	-30.0	-29.6	-1.1	-3.0
A1	orange	93.9	4.5	62.5	63.4	34.4	33.2	52.6	48.4
B2	purplish blue	99.1	1.7	40.7	42.1	9.6	8.7	-43.8	-43.7
C2	moderate red	94.2	3.4	49.0	50.0	46.7	46.6	12.9	9.6
D2	purple	99.5	1.4	31.5	32.8	22.8	22.8	-21.8	-22.5
E2	yellow green	94.9	4.0	72.9	74.1	-23.7	-24.4	59.4	55.7
F2	orange yellow	94.7	4.2	71.8	72.8	18.4	16.7	65.1	61.4
A3	blue	98.6	1.6	29.3	30.4	13.4	12.2	-47.4	-47.0
B3	green	95.2	2.9	55.7	56.9	-35.3	-35.5	29.5	26.8
C3	red	97.8	1.8	38.6	39.1	52.8	53.5	25.8	24.1
D3	yellow	98.6	2.0	80.5	81.3	5.7	3.8	94.6	94.3
E3	magenta	98.3	1.6	52.5	53.4	47.7	47.4	-13.9	-15.2
F3	cyan	100.0	1.2	51.7	52.8	-29.0	-29.2	-29.2	-29.1
A4	white	98.9	0.7	94.5	94.8	0.2	-0.1	3.1	2.5
B4	neutral 8	100.0	0.7	80.5	81.2	-0.1	-0.4	1.2	1.1
C4	neutral 6.5	100.0	1.1	67.5	68.5	0.3	0.1	0.2	0.0
D4	neutral 5	99.3	1.3	52.3	53.5	0.5	0.4	-0.2	-0.8
E4	neutral 3.5	100.0	1.4	39.0	40.3	0.6	0.5	-1.2	-1.6
F4	black	100.0	1.0	26.5	27.5	0.7	0.5	-1.0	-0.9
A5	paper white	100.0	0.5	97.6	98.0	0.5	0.4	1.4	1.0
B5	Skin highlight L*=88	86.3	3.1	86.8	87.5	13.6	13.0	12.8	9.8
C5	Skin highlight L* =75	90.4	3.2	74.6	75.9	19.5	18.6	16.8	14.0
D5	Skin shadow L*=28	99.2	1.3	30.2	31.3	19.1	19.2	17.7	17.0
E5	Skin shadow L*=13	100.0	1.0	22.7	23.6	15.6	15.9	15.0	15.2
F5	Maximum Black	100.0	0.5	12.0	12.5	0.0	-0.1	0.1	0.3

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	97.1	96.6	1.9
Worst 10% (3 lowest scoring patches)	89.1	93.2	4.2

40 Megalux hours

Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



Original Print Colors before light exposure

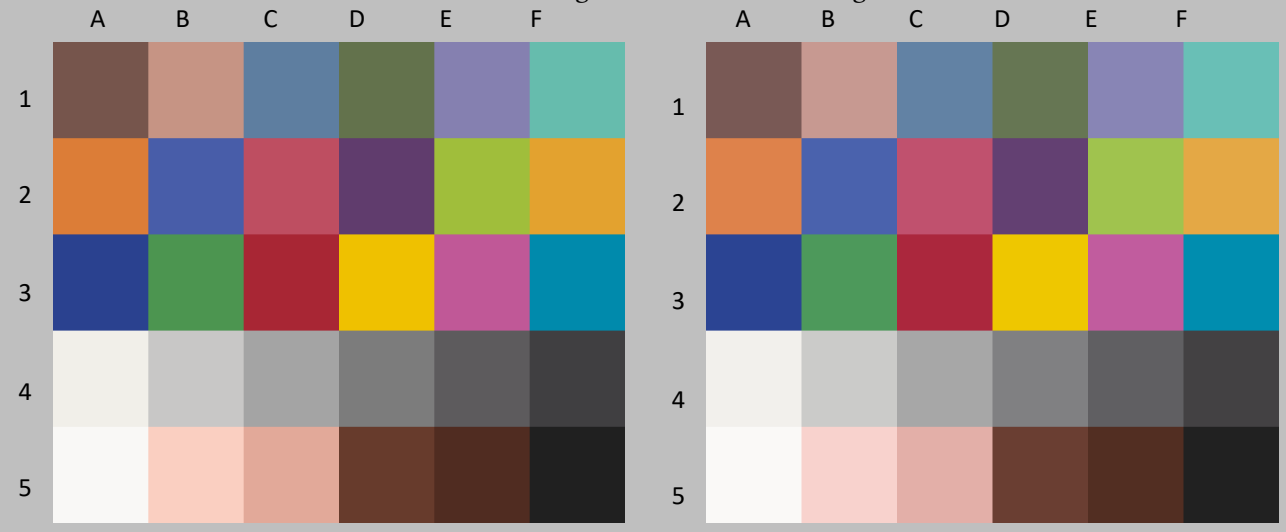
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	89.4	2.7	39.5	40.9	12.8	12.8	11.5	9.2
B1	Light Skin	86.2	4.1	65.8	67.3	17.5	17.1	16.0	12.2
C1	Blue sky	100.0	1.7	51.4	53.0	-4.7	-5.0	-21.9	-22.0
D1	Foliage	94.6	2.1	46.0	47.2	-11.0	-11.2	19.1	17.4
E1	blue flower	99.7	1.9	55.3	57.1	10.0	9.4	-24.8	-25.0
F1	bluish green	92.7	2.9	70.6	71.7	-30.0	-29.5	-1.1	-3.7
A1	orange	91.6	5.9	62.5	63.7	34.4	33.1	52.6	47.0
B2	purplish blue	99.4	1.8	40.7	42.3	9.6	8.9	-43.8	-44.1
C2	moderate red	91.7	4.6	49.0	50.1	46.7	46.8	12.9	8.4
D2	purple	97.9	1.8	31.5	32.9	22.8	23.0	-21.8	-22.9
E2	yellow green	92.9	5.2	72.9	74.4	-23.7	-24.6	59.4	54.5
F2	orange yellow	92.6	5.6	71.8	73.1	18.4	16.6	65.1	59.9
A3	blue	98.7	1.7	29.3	30.6	13.4	12.3	-47.4	-47.2
B3	green	92.9	4.0	55.7	57.0	-35.3	-35.5	29.5	25.7
C3	red	96.5	2.6	38.6	39.2	52.8	53.6	25.8	23.3
D3	yellow	98.1	2.5	80.5	81.6	5.7	3.4	94.6	94.1
E3	magenta	97.0	2.3	52.5	53.6	47.7	47.4	-13.9	-15.9
F3	cyan	100.0	1.2	51.7	52.9	-29.0	-29.1	-29.2	-29.3
A4	white	97.5	0.9	94.5	94.9	0.2	-0.1	3.1	2.4
B4	neutral 8	100.0	1.0	80.5	81.4	-0.1	-0.4	1.2	0.9
C4	neutral 6.5	100.0	1.3	67.5	68.7	0.3	0.1	0.2	-0.2
D4	neutral 5	96.8	1.6	52.3	53.7	0.5	0.4	-0.2	-1.0
E4	neutral 3.5	98.7	1.6	39.0	40.4	0.6	0.5	-1.2	-1.8
F4	black	100.0	1.2	26.5	27.7	0.7	0.5	-1.0	-0.9
A5	paper white	100.0	0.6	97.6	98.0	0.5	0.4	1.4	1.0
B5	Skin highlight L*=88	80.4	4.2	86.8	87.7	13.6	13.1	12.8	8.6
C5	Skin highlight L* =75	85.6	4.5	74.6	76.2	19.5	18.7	16.8	12.7
D5	Skin shadow L*=28	97.1	1.8	30.2	31.5	19.1	19.3	17.7	16.5
E5	Skin shadow L*=13	100.0	1.1	22.7	23.6	15.6	16.0	15.0	15.2
F5	Maximum Black	100.0	0.6	12.0	12.5	0.0	0.0	0.1	0.4

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	95.6	96.1	2.5
Worst 10% (3 lowest scoring patches)	84.0	92.3	5.6

50 Megalux hours

Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



Original Print Colors before light exposure

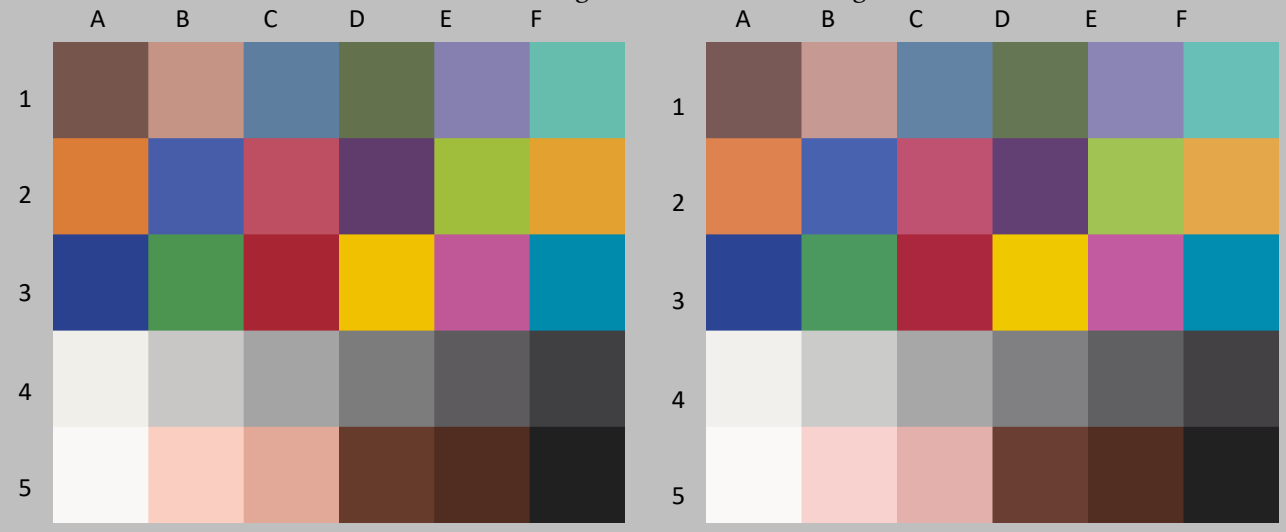
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	85.1	3.4	39.5	41.0	12.8	12.9	11.5	8.4
B1	Light Skin	81.7	5.1	65.8	67.4	17.5	17.1	16.0	11.1
C1	Blue sky	100.0	1.8	51.4	53.1	-4.7	-5.0	-21.9	-22.1
D1	Foliage	92.0	2.6	46.0	47.3	-11.0	-11.1	19.1	16.9
E1	blue flower	99.6	2.0	55.3	57.2	10.0	9.5	-24.8	-25.2
F1	bluish green	90.3	3.6	70.6	71.7	-30.0	-29.3	-1.1	-4.4
A1	orange	88.8	7.6	62.5	63.8	34.4	32.9	52.6	45.2
B2	purplish blue	99.5	1.8	40.7	42.4	9.6	9.0	-43.8	-44.2
C2	moderate red	89.1	5.9	49.0	50.1	46.7	46.7	12.9	7.1
D2	purple	97.3	2.1	31.5	33.1	22.8	23.0	-21.8	-23.1
E2	yellow green	90.2	7.0	72.9	74.5	-23.7	-24.6	59.4	52.7
F2	orange yellow	90.2	7.3	71.8	73.2	18.4	16.4	65.1	58.2
A3	blue	98.9	1.7	29.3	30.6	13.4	12.4	-47.4	-47.3
B3	green	90.7	5.0	55.7	57.1	-35.3	-35.4	29.5	24.7
C3	red	95.1	3.4	38.6	39.2	52.8	53.6	25.8	22.5
D3	yellow	97.5	3.1	80.5	81.7	5.7	3.0	94.6	93.6
E3	magenta	95.8	2.8	52.5	53.6	47.7	47.4	-13.9	-16.5
F3	cyan	100.0	1.2	51.7	52.9	-29.0	-29.0	-29.2	-29.3
A4	white	96.3	0.9	94.5	94.9	0.2	-0.1	3.1	2.3
B4	neutral 8	100.0	1.0	80.5	81.4	-0.1	-0.4	1.2	0.9
C4	neutral 6.5	99.6	1.3	67.5	68.7	0.3	0.1	0.2	-0.3
D4	neutral 5	94.7	1.8	52.3	53.8	0.5	0.4	-0.2	-1.2
E4	neutral 3.5	96.5	1.7	39.0	40.5	0.6	0.6	-1.2	-2.1
F4	black	100.0	1.1	26.5	27.7	0.7	0.5	-1.0	-0.9
A5	paper white	100.0	0.6	97.6	98.0	0.5	0.3	1.4	1.0
B5	Skin highlight L*=88	75.7	5.1	86.8	87.6	13.6	13.2	12.8	7.8
C5	Skin highlight L* =75	81.1	5.6	74.6	76.3	19.5	18.7	16.8	11.5
D5	Skin shadow L*=28	94.9	2.3	30.2	31.6	19.1	19.4	17.7	15.9
E5	Skin shadow L*=13	100.0	1.1	22.7	23.7	15.6	16.0	15.0	14.8
F5	Maximum Black	100.0	0.7	12.0	12.7	0.0	0.0	0.1	0.4

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	94.0	95.7	3.0
Worst 10% (3 lowest scoring patches)	79.5	91.6	7.3

60 Megalux hours

Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



Original Print Colors before light exposure

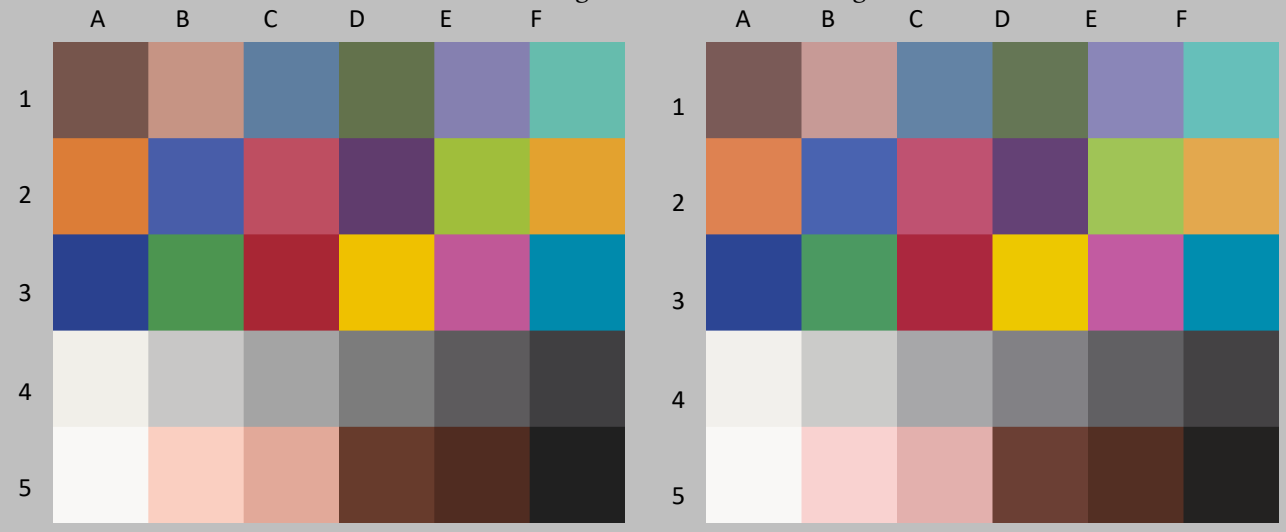
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	80.0	4.3	39.5	41.2	12.8	13.0	11.5	7.5
B1	Light Skin	77.0	6.2	65.8	67.5	17.5	17.3	16.0	10.0
C1	Blue sky	100.0	1.9	51.4	53.2	-4.7	-4.9	-21.9	-22.2
D1	Foliage	89.1	3.2	46.0	47.4	-11.0	-11.0	19.1	16.2
E1	blue flower	99.0	2.1	55.3	57.3	10.0	9.6	-24.8	-25.5
F1	bluish green	88.4	4.2	70.6	71.8	-30.0	-29.1	-1.1	-4.9
A1	orange	86.1	9.4	62.5	63.9	34.4	32.9	52.6	43.5
B2	purplish blue	99.0	1.9	40.7	42.4	9.6	9.2	-43.8	-44.6
C2	moderate red	86.6	7.1	49.0	50.1	46.7	47.0	12.9	5.9
D2	purple	95.7	2.4	31.5	33.1	22.8	23.2	-21.8	-23.6
E2	yellow green	88.0	8.4	72.9	74.6	-23.7	-24.8	59.4	51.3
F2	orange yellow	87.4	9.1	71.8	73.3	18.4	16.3	65.1	56.3
A3	blue	98.8	1.8	29.3	30.7	13.4	12.3	-47.4	-47.2
B3	green	88.1	6.2	55.7	57.2	-35.3	-35.3	29.5	23.5
C3	red	93.6	4.3	38.6	39.2	52.8	53.7	25.8	21.6
D3	yellow	97.0	3.6	80.5	81.9	5.7	2.7	94.6	93.1
E3	magenta	94.7	3.3	52.5	53.6	47.7	47.5	-13.9	-17.0
F3	cyan	100.0	1.2	51.7	52.9	-29.0	-29.0	-29.2	-29.3
A4	white	97.0	0.9	94.5	94.8	0.2	-0.1	3.1	2.3
B4	neutral 8	100.0	1.0	80.5	81.4	-0.1	-0.4	1.2	0.9
C4	neutral 6.5	98.4	1.4	67.5	68.7	0.3	0.2	0.2	-0.4
D4	neutral 5	92.8	1.9	52.3	53.8	0.5	0.5	-0.2	-1.4
E4	neutral 3.5	95.8	1.8	39.0	40.5	0.6	0.6	-1.2	-2.1
F4	black	100.0	1.3	26.5	27.8	0.7	0.6	-1.0	-0.9
A5	paper white	100.0	0.5	97.6	97.9	0.5	0.4	1.4	1.0
B5	Skin highlight L*=88	70.7	6.0	86.8	87.6	13.6	13.4	12.8	6.8
C5	Skin highlight L* =75	76.0	6.9	74.6	76.3	19.5	18.9	16.8	10.1
D5	Skin shadow L*=28	92.4	2.8	30.2	31.5	19.1	19.5	17.7	15.3
E5	Skin shadow L*=13	100.0	1.2	22.7	23.7	15.6	16.0	15.0	14.7
F5	Maximum Black	100.0	0.8	12.0	12.8	0.0	0.1	0.1	0.3

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	92.4	95.5	3.6
Worst 10% (3 lowest scoring patches)	74.6	91.6	8.9

70 Megalux hours

Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



Original Print Colors before light exposure

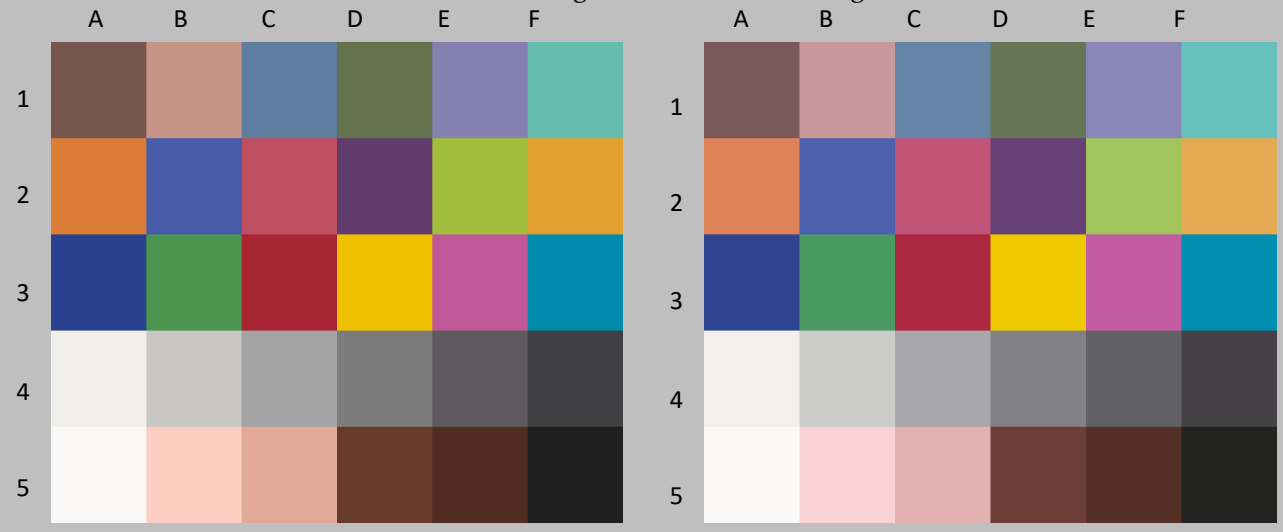
Colors After light exposure

				L*		a*		b*	
Patch #	Description	I* Color	ΔE	Before	After	Before	After	Before	After
A1	Dark Skin	75.2	5.1	39.5	41.4	12.8	13.1	11.5	6.7
B1	Light Skin	71.7	7.5	65.8	67.8	17.5	17.4	16.0	8.8
C1	Blue sky	100.0	2.1	51.4	53.4	-4.7	-4.8	-21.9	-22.3
D1	Foliage	86.3	3.8	46.0	47.5	-11.0	-10.8	19.1	15.6
E1	blue flower	98.1	2.4	55.3	57.5	10.0	9.7	-24.8	-25.8
F1	bluish green	85.9	4.9	70.6	71.9	-30.0	-28.9	-1.1	-5.7
A1	orange	83.0	11.3	62.5	64.0	34.4	32.9	52.6	41.5
B2	purplish blue	98.8	2.2	40.7	42.6	9.6	9.4	-43.8	-44.8
C2	moderate red	83.8	8.4	49.0	50.3	46.7	47.2	12.9	4.6
D2	purple	94.5	2.8	31.5	33.2	22.8	23.4	-21.8	-23.9
E2	yellow green	85.2	10.1	72.9	74.8	-23.7	-24.7	59.4	49.5
F2	orange yellow	84.7	11.0	71.8	73.5	18.4	16.2	65.1	54.4
A3	blue	98.9	1.9	29.3	30.9	13.4	12.4	-47.4	-47.2
B3	green	85.8	7.2	55.7	57.4	-35.3	-35.1	29.5	22.4
C3	red	92.5	4.9	38.6	39.2	52.8	53.7	25.8	21.0
D3	yellow	96.4	4.2	80.5	82.0	5.7	2.3	94.6	92.5
E3	magenta	93.3	4.0	52.5	53.8	47.7	47.5	-13.9	-17.7
F3	cyan	100.0	1.5	51.7	53.1	-29.0	-28.6	-29.2	-29.1
A4	white	95.5	1.0	94.5	94.8	0.2	-0.1	3.1	2.2
B4	neutral 8	100.0	1.0	80.5	81.4	-0.1	-0.4	1.2	0.8
C4	neutral 6.5	97.1	1.5	67.5	68.8	0.3	0.1	0.2	-0.6
D4	neutral 5	90.4	2.2	52.3	54.0	0.5	0.6	-0.2	-1.6
E4	neutral 3.5	95.5	1.9	39.0	40.6	0.6	0.7	-1.2	-2.1
F4	black	100.0	1.5	26.5	28.0	0.7	0.6	-1.0	-0.8
A5	paper white	100.0	0.4	97.6	97.8	0.5	0.3	1.4	1.0
B5	Skin highlight L*=88	65.5	7.0	86.8	87.6	13.6	13.6	12.8	5.8
C5	Skin highlight L* =75	70.8	8.2	74.6	76.5	19.5	19.0	16.8	8.8
D5	Skin shadow L*=28	89.8	3.5	30.2	31.7	19.1	19.4	17.7	14.6
E5	Skin shadow L*=13	99.6	1.3	22.7	23.8	15.6	16.0	15.0	14.5
F5	Maximum Black	100.0	1.2	12.0	13.2	0.0	0.1	0.1	0.6

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	90.6	94.8	4.2
Worst 10% (3 lowest scoring patches)	69.3	90.5	10.8

80 Megalux hours

Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



Original Print Colors before light exposure

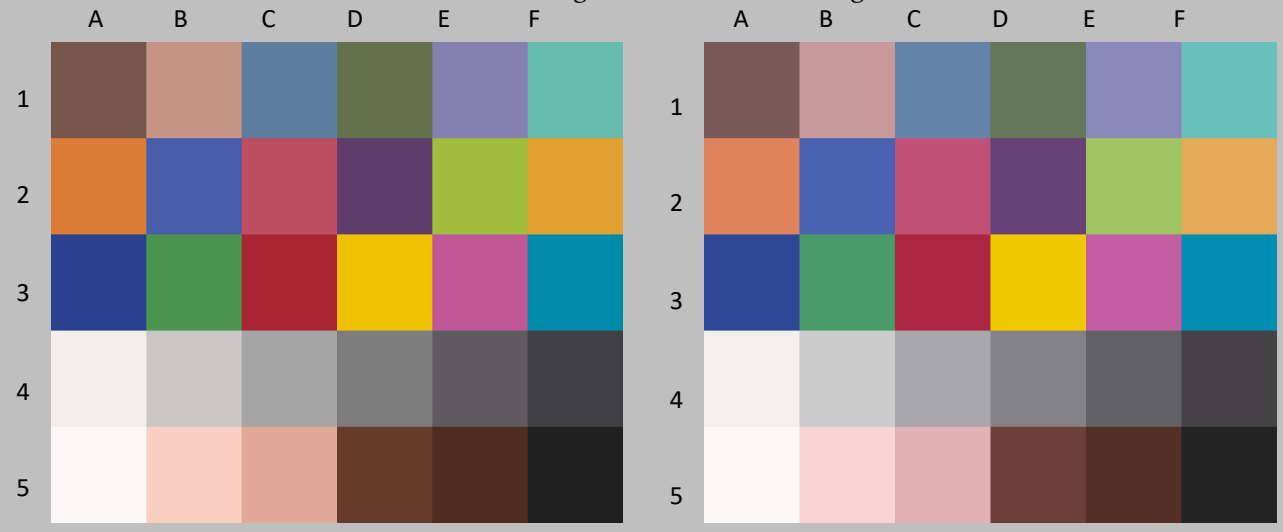
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	70.8	5.9	39.5	41.6	12.8	13.2	11.5	6.0
B1	Light Skin	66.1	8.8	65.8	68.0	17.5	17.7	16.0	7.4
C1	Blue sky	99.8	2.3	51.4	53.6	-4.7	-4.7	-21.9	-22.5
D1	Foliage	83.8	4.4	46.0	47.7	-11.0	-10.8	19.1	15.0
E1	blue flower	96.6	2.7	55.3	57.7	10.0	9.8	-24.8	-26.2
F1	bluish green	83.2	5.7	70.6	72.1	-30.0	-28.6	-1.1	-6.4
A1	orange	79.6	13.4	62.5	64.3	34.4	32.8	52.6	39.4
B2	purplish blue	97.7	2.6	40.7	42.8	9.6	9.7	-43.8	-45.3
C2	moderate red	80.8	9.9	49.0	50.5	46.7	47.4	12.9	3.1
D2	purple	92.8	3.4	31.5	33.5	22.8	23.5	-21.8	-24.5
E2	yellow green	82.1	12.1	72.9	75.1	-23.7	-24.7	59.4	47.5
F2	orange yellow	81.6	13.1	71.8	73.8	18.4	16.0	65.1	52.3
A3	blue	99.3	1.9	29.3	31.0	13.4	12.5	-47.4	-47.4
B3	green	82.8	8.6	55.7	57.7	-35.3	-34.9	29.5	21.1
C3	red	90.8	6.0	38.6	39.4	52.8	53.9	25.8	20.0
D3	yellow	95.6	5.0	80.5	82.4	5.7	2.0	94.6	91.8
E3	magenta	91.9	4.8	52.5	54.0	47.7	47.8	-13.9	-18.4
F3	cyan	100.0	1.6	51.7	53.3	-29.0	-28.7	-29.2	-29.4
A4	white	93.2	1.3	94.5	95.0	0.2	-0.1	3.1	1.9
B4	neutral 8	99.0	1.3	80.5	81.6	-0.1	-0.4	1.2	0.7
C4	neutral 6.5	95.2	1.8	67.5	69.0	0.3	0.2	0.2	-0.8
D4	neutral 5	87.1	2.6	52.3	54.2	0.5	0.6	-0.2	-2.0
E4	neutral 3.5	92.5	2.3	39.0	40.9	0.6	0.8	-1.2	-2.4
F4	black	100.0	1.8	26.5	28.3	0.7	0.6	-1.0	-0.8
A5	paper white	100.0	0.6	97.6	98.0	0.5	0.3	1.4	1.0
B5	Skin highlight L*=88	60.5	7.9	86.8	87.9	13.6	13.8	12.8	4.9
C5	Skin highlight L* =75	65.3	9.7	74.6	76.8	19.5	19.2	16.8	7.3
D5	Skin shadow L*=28	87.2	4.2	30.2	31.9	19.1	19.6	17.7	13.9
E5	Skin shadow L*=13	98.3	1.7	22.7	24.1	15.6	16.1	15.0	14.2
F5	Maximum Black	100.0	1.6	12.0	13.6	0.0	0.1	0.1	0.6

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	88.5	94.4	5.0
Worst 10% (3 lowest scoring patches)	63.9	89.9	12.9

90 Megalux hours

Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



Original Print Colors before light exposure

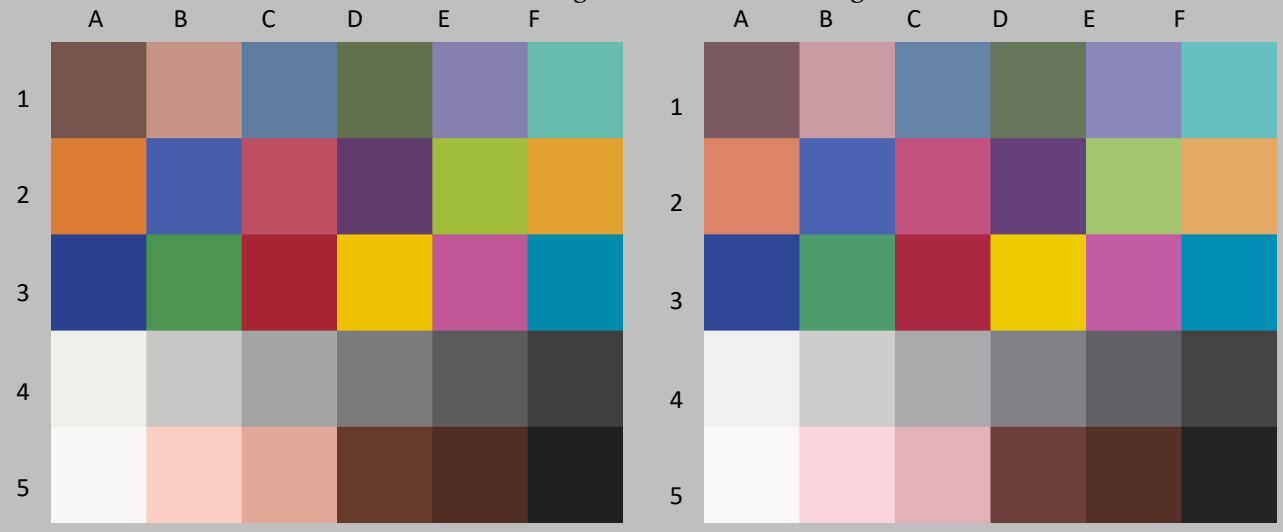
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	65.0	6.9	39.5	41.7	12.8	13.4	11.5	5.0
B1	Light Skin	59.9	10.3	65.8	68.2	17.5	17.9	16.0	6.0
C1	Blue sky	98.7	2.5	51.4	53.7	-4.7	-4.6	-21.9	-22.7
D1	Foliage	80.4	5.2	46.0	47.8	-11.0	-10.6	19.1	14.3
E1	blue flower	94.9	3.1	55.3	57.9	10.0	10.1	-24.8	-26.7
F1	bluish green	80.3	6.6	70.6	72.2	-30.0	-28.4	-1.1	-7.3
A1	orange	76.0	15.7	62.5	64.4	34.4	33.0	52.6	37.1
B2	purplish blue	96.9	2.9	40.7	42.9	9.6	9.8	-43.8	-45.7
C2	moderate red	77.6	11.5	49.0	50.6	46.7	47.7	12.9	1.6
D2	purple	90.8	4.0	31.5	33.6	22.8	23.8	-21.8	-25.1
E2	yellow green	78.4	14.5	72.9	75.4	-23.7	-24.6	59.4	45.2
F2	orange yellow	78.2	15.4	71.8	73.9	18.4	16.1	65.1	50.0
A3	blue	99.5	2.1	29.3	31.3	13.4	12.7	-47.4	-47.6
B3	green	79.6	10.1	55.7	57.9	-35.3	-34.7	29.5	19.6
C3	red	88.8	7.1	38.6	39.6	52.8	53.9	25.8	18.8
D3	yellow	94.9	5.8	80.5	82.6	5.7	1.6	94.6	91.1
E3	magenta	90.2	5.6	52.5	54.0	47.7	48.0	-13.9	-19.3
F3	cyan	99.9	1.7	51.7	53.3	-29.0	-28.6	-29.2	-29.6
A4	white	91.1	1.5	94.5	95.1	0.2	0.0	3.1	1.7
B4	neutral 8	97.5	1.4	80.5	81.7	-0.1	-0.3	1.2	0.5
C4	neutral 6.5	93.1	2.0	67.5	69.1	0.3	0.3	0.2	-1.0
D4	neutral 5	83.3	2.9	52.3	54.3	0.5	0.7	-0.2	-2.3
E4	neutral 3.5	88.9	2.6	39.0	41.0	0.6	0.9	-1.2	-2.8
F4	black	100.0	1.8	26.5	28.4	0.7	0.7	-1.0	-0.9
A5	paper white	100.0	0.7	97.6	98.1	0.5	0.3	1.4	1.0
B5	Skin highlight L*=88	55.0	9.0	86.8	88.0	13.6	14.0	12.8	3.9
C5	Skin highlight L* =75	59.3	11.3	74.6	77.0	19.5	19.4	16.8	5.8
D5	Skin shadow L*=28	84.4	4.9	30.2	32.0	19.1	19.8	17.7	13.2
E5	Skin shadow L*=13	97.3	1.8	22.7	24.1	15.6	16.2	15.0	14.0
F5	Maximum Black	100.0	1.7	12.0	13.7	0.0	0.1	0.1	0.4

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	86.0	94.0	5.7
Worst 10% (3 lowest scoring patches)	58.0	89.4	15.2

100 Megalux hours

Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



Original Print Colors before light exposure

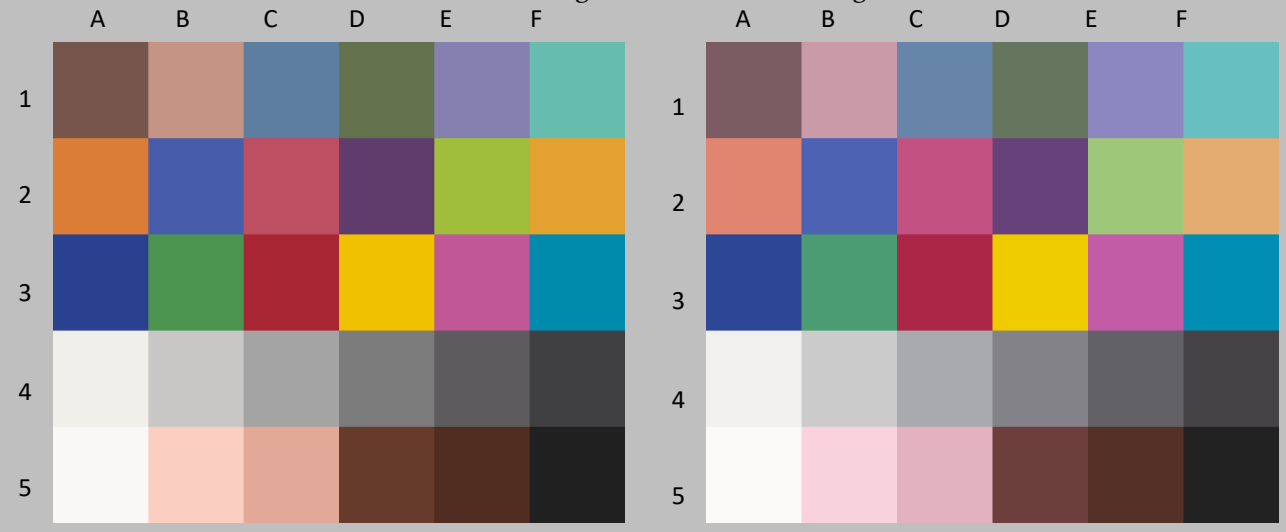
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	55.0	8.6	39.5	42.0	12.8	13.7	11.5	3.3
B1	Light Skin	48.1	13.1	65.8	68.5	17.5	18.5	16.0	3.2
C1	Blue sky	97.0	2.8	51.4	53.9	-4.7	-4.4	-21.9	-23.1
D1	Foliage	74.5	6.4	46.0	47.9	-11.0	-10.4	19.1	13.0
E1	blue flower	92.5	3.7	55.3	58.1	10.0	10.4	-24.8	-27.3
F1	bluish green	74.9	8.2	70.6	72.3	-30.0	-27.8	-1.1	-8.8
A1	orange	68.2	20.6	62.5	64.7	34.4	33.3	52.6	32.2
B2	purplish blue	95.6	3.4	40.7	43.0	9.6	10.2	-43.8	-46.2
C2	moderate red	71.7	14.3	49.0	50.8	46.7	48.2	12.9	-1.2
D2	purple	87.9	4.9	31.5	33.8	22.8	24.3	-21.8	-25.9
E2	yellow green	70.8	19.4	72.9	75.8	-23.7	-24.2	59.4	40.3
F2	orange yellow	70.9	20.3	71.8	74.2	18.4	16.2	65.1	45.0
A3	blue	99.7	2.2	29.3	31.4	13.4	13.0	-47.4	-47.9
B3	green	72.9	13.2	55.7	58.1	-35.3	-34.2	29.5	16.6
C3	red	85.6	9.0	38.6	39.7	52.8	54.3	25.8	17.0
D3	yellow	93.1	7.4	80.5	82.8	5.7	1.2	94.6	89.2
E3	magenta	87.8	6.8	52.5	54.2	47.7	48.4	-13.9	-20.4
F3	cyan	99.2	1.9	51.7	53.4	-29.0	-28.4	-29.2	-29.8
A4	white	88.7	1.7	94.5	95.0	0.2	0.1	3.1	1.5
B4	neutral 8	95.7	1.5	80.5	81.8	-0.1	-0.2	1.2	0.3
C4	neutral 6.5	89.0	2.3	67.5	69.3	0.3	0.5	0.2	-1.3
D4	neutral 5	77.4	3.5	52.3	54.5	0.5	1.0	-0.2	-2.8
E4	neutral 3.5	84.9	2.9	39.0	41.2	0.6	1.0	-1.2	-3.1
F4	black	100.0	1.9	26.5	28.5	0.7	0.7	-1.0	-0.9
A5	paper white	100.0	0.6	97.6	98.1	0.5	0.4	1.4	1.1
B5	Skin highlight L*=88	46.3	10.6	86.8	88.1	13.6	14.3	12.8	2.3
C5	Skin highlight L* =75	48.7	14.0	74.6	77.2	19.5	19.9	16.8	3.1
D5	Skin shadow L*=28	78.3	6.4	30.2	32.2	19.1	19.9	17.7	11.6
E5	Skin shadow L*=13	94.4	2.4	22.7	24.3	15.6	16.3	15.0	13.4
F5	Maximum Black	100.0	1.6	12.0	13.6	0.0	0.2	0.1	0.3

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	81.6	93.5	7.2
Worst 10% (3 lowest scoring patches)	47.7	88.0	20.1

120 Megalux hours

Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



Original Print Colors before light exposure

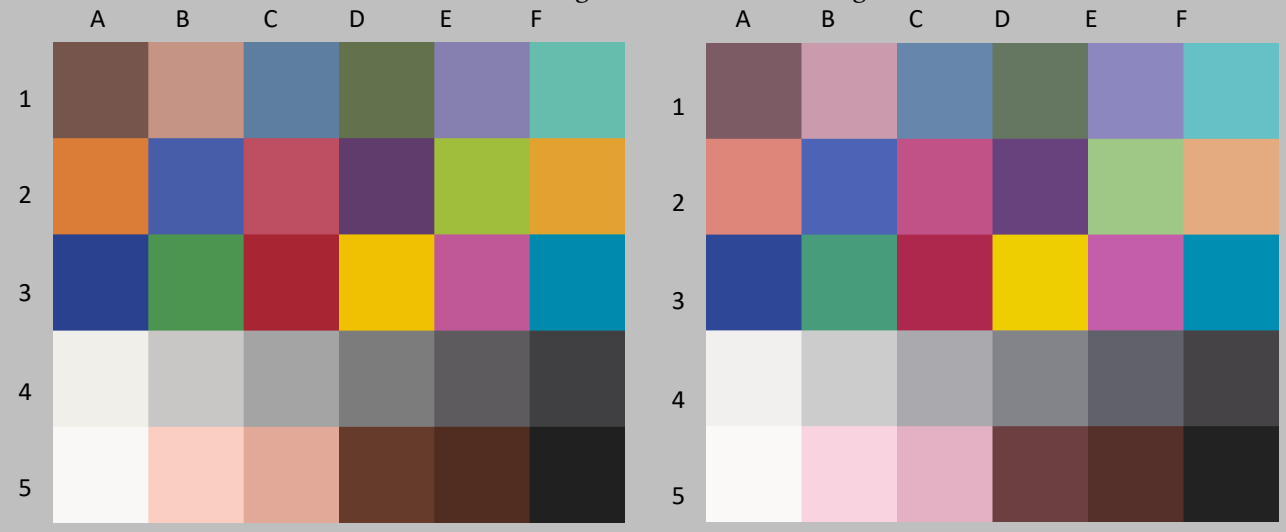
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	44.3	10.4	39.5	42.2	12.8	14.0	11.5	1.5
B1	Light Skin	36.2	15.9	65.8	68.7	17.5	19.1	16.0	0.4
C1	Blue sky	95.3	3.1	51.4	54.0	-4.7	-4.2	-21.9	-23.4
D1	Foliage	67.5	7.9	46.0	48.0	-11.0	-10.2	19.1	11.5
E1	blue flower	90.4	4.2	55.3	58.3	10.0	10.6	-24.8	-27.8
F1	bluish green	69.2	9.9	70.6	72.3	-30.0	-27.2	-1.1	-10.4
A1	orange	59.5	26.0	62.5	64.9	34.4	33.7	52.6	26.7
B2	purplish blue	94.8	3.7	40.7	43.2	9.6	10.5	-43.8	-46.5
C2	moderate red	65.5	17.3	49.0	50.9	46.7	48.7	12.9	-4.2
D2	purple	85.8	5.5	31.5	34.0	22.8	24.5	-21.8	-26.5
E2	yellow green	61.6	25.2	72.9	76.1	-23.7	-23.7	59.4	34.4
F2	orange yellow	61.8	26.4	71.8	74.5	18.4	16.4	65.1	38.8
A3	blue	99.4	2.2	29.3	31.3	13.4	13.1	-47.4	-48.1
B3	green	64.9	16.8	55.7	58.2	-35.3	-33.5	29.5	12.9
C3	red	82.1	11.1	38.6	39.6	52.8	54.7	25.8	14.9
D3	yellow	90.2	10.1	80.5	83.0	5.7	0.6	94.6	86.3
E3	magenta	85.6	7.8	52.5	54.2	47.7	48.6	-13.9	-21.5
F3	cyan	98.7	2.0	51.7	53.4	-29.0	-28.2	-29.2	-29.9
A4	white	83.2	2.1	94.5	94.9	0.2	0.2	3.1	1.0
B4	neutral 8	91.8	1.7	80.5	81.7	-0.1	-0.2	1.2	-0.1
C4	neutral 6.5	84.7	2.7	67.5	69.3	0.3	0.5	0.2	-1.8
D4	neutral 5	70.3	4.0	52.3	54.6	0.5	1.2	-0.2	-3.5
E4	neutral 3.5	81.1	3.2	39.0	41.2	0.6	1.1	-1.2	-3.5
F4	black	100.0	2.0	26.5	28.5	0.7	0.8	-1.0	-1.0
A5	paper white	100.0	0.5	97.6	97.9	0.5	0.3	1.4	1.0
B5	Skin highlight L*=88	36.5	12.4	86.8	88.0	13.6	14.7	12.8	0.5
C5	Skin highlight L* =75	38.1	16.6	74.6	77.2	19.5	20.2	16.8	0.4
D5	Skin shadow L*=28	71.6	8.2	30.2	32.3	19.1	20.0	17.7	9.9
E5	Skin shadow L*=13	91.2	2.8	22.7	24.2	15.6	16.5	15.0	12.7
F5	Maximum Black	100.0	1.3	12.0	13.3	0.0	0.2	0.1	0.4

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	76.7	92.6	8.8
Worst 10% (3 lowest scoring patches)	36.9	85.8	25.9

140 Megalux hours

Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



Original Print Colors before light exposure

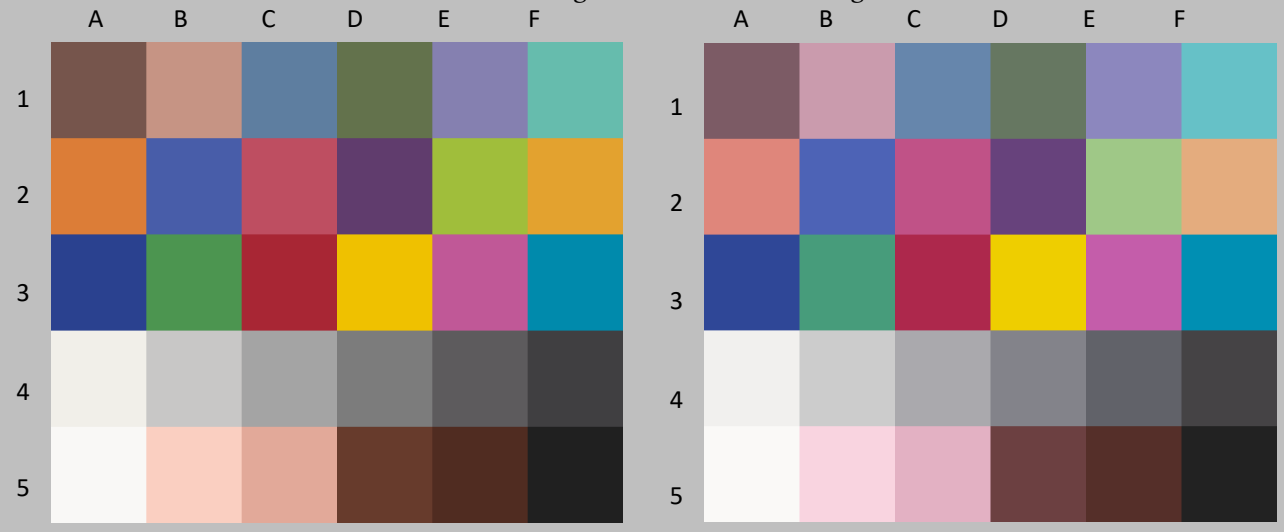
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	33.6	12.2	39.5	42.3	12.8	14.5	11.5	-0.3
B1	Light Skin	25.6	18.4	65.8	69.1	17.5	19.6	16.0	-2.0
C1	Blue sky	93.6	3.6	51.4	54.3	-4.7	-4.0	-21.9	-23.8
D1	Foliage	60.2	9.5	46.0	48.2	-11.0	-9.9	19.1	9.9
E1	blue flower	88.1	4.9	55.3	58.6	10.0	10.8	-24.8	-28.3
F1	bluish green	63.8	11.5	70.6	72.5	-30.0	-26.5	-1.1	-11.9
A1	orange	50.6	31.7	62.5	65.3	34.4	34.2	52.6	21.0
B2	purplish blue	94.0	4.2	40.7	43.4	9.6	10.7	-43.8	-46.8
C2	moderate red	59.7	20.1	49.0	51.1	46.7	49.4	12.9	-7.0
D2	purple	82.6	6.5	31.5	34.2	22.8	25.1	-21.8	-27.3
E2	yellow green	52.1	31.4	72.9	76.6	-23.7	-22.9	59.4	28.3
F2	orange yellow	52.5	32.8	71.8	75.0	18.4	16.7	65.1	32.5
A3	blue	99.3	2.5	29.3	31.6	13.4	13.3	-47.4	-48.2
B3	green	56.5	20.7	55.7	58.6	-35.3	-32.5	29.5	9.2
C3	red	78.0	13.5	38.6	39.8	52.8	55.1	25.8	12.6
D3	yellow	86.9	13.2	80.5	83.5	5.7	0.1	94.6	83.0
E3	magenta	83.9	8.8	52.5	54.6	47.7	48.9	-13.9	-22.3
F3	cyan	98.0	2.4	51.7	53.8	-29.0	-27.9	-29.2	-30.0
A4	white	79.1	2.5	94.5	95.0	0.2	0.3	3.1	0.6
B4	neutral 8	88.9	2.0	80.5	81.9	-0.1	-0.2	1.2	-0.4
C4	neutral 6.5	79.5	3.2	67.5	69.6	0.3	0.7	0.2	-2.2
D4	neutral 5	63.5	4.7	52.3	54.9	0.5	1.4	-0.2	-4.1
E4	neutral 3.5	76.5	3.7	39.0	41.5	0.6	1.2	-1.2	-3.9
F4	black	100.0	2.0	26.5	28.6	0.7	0.8	-1.0	-1.0
A5	paper white	100.0	0.6	97.6	98.0	0.5	0.3	1.4	1.0
B5	Skin highlight L*=88	27.7	14.1	86.8	88.3	13.6	15.0	12.8	-1.2
C5	Skin highlight L* =75	29.0	19.0	74.6	77.4	19.5	20.7	16.8	-2.0
D5	Skin shadow L*=28	64.4	10.0	30.2	32.5	19.1	20.5	17.7	8.0
E5	Skin shadow L*=13	87.6	3.6	22.7	24.3	15.6	16.7	15.0	11.9
F5	Maximum Black	100.0	1.5	12.0	13.5	0.0	0.1	0.1	0.3

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	71.8	92.1	10.5
Worst 10% (3 lowest scoring patches)	27.4	84.3	32.0

160 Megalux hours

Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



Original Print Colors before light exposure

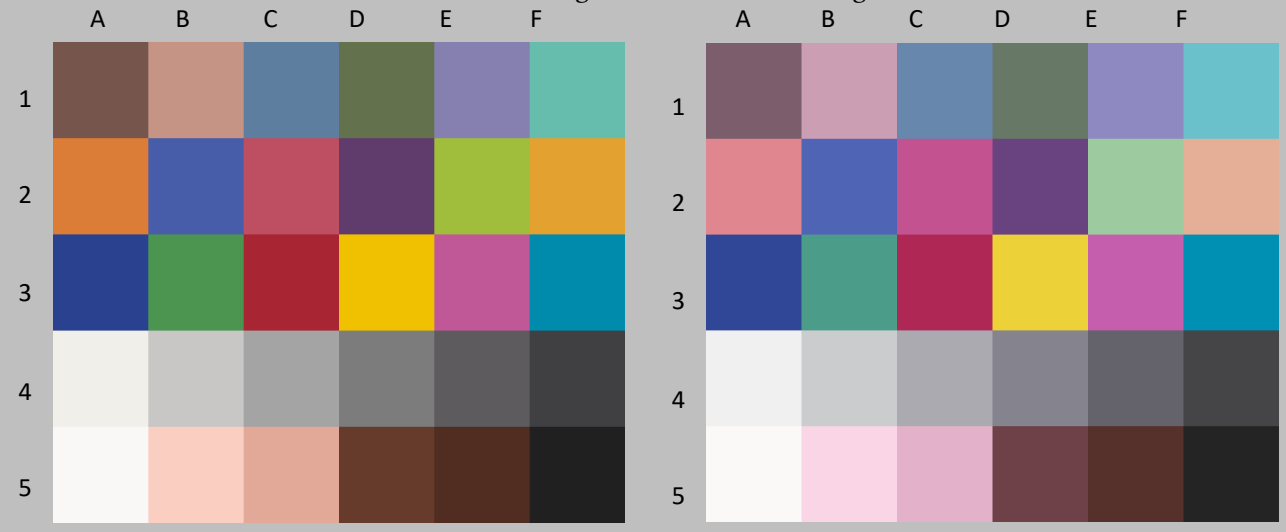
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	25.5	13.7	39.5	42.7	12.8	14.8	11.5	-1.7
B1	Light Skin	17.9	20.3	65.8	69.4	17.5	19.9	16.0	-3.9
C1	Blue sky	93.2	3.9	51.4	54.7	-4.7	-4.0	-21.9	-23.8
D1	Foliage	53.1	11.1	46.0	48.5	-11.0	-9.6	19.1	8.4
E1	blue flower	87.3	5.3	55.3	59.0	10.0	10.9	-24.8	-28.6
F1	bluish green	58.6	13.1	70.6	72.8	-30.0	-26.0	-1.1	-13.4
A1	orange	41.7	37.3	62.5	65.8	34.4	34.9	52.6	15.5
B2	purplish blue	93.8	4.4	40.7	43.7	9.6	10.8	-43.8	-46.8
C2	moderate red	55.2	22.3	49.0	51.5	46.7	49.9	12.9	-9.1
D2	purple	80.9	7.2	31.5	34.6	22.8	25.4	-21.8	-27.8
E2	yellow green	41.6	38.1	72.9	77.1	-23.7	-22.0	59.4	21.6
F2	orange yellow	43.0	39.2	71.8	75.4	18.4	17.3	65.1	26.0
A3	blue	99.5	2.8	29.3	32.0	13.4	13.3	-47.4	-48.1
B3	green	47.7	24.8	55.7	58.9	-35.3	-31.6	29.5	5.2
C3	red	74.1	15.8	38.6	40.2	52.8	55.4	25.8	10.3
D3	yellow	82.2	17.7	80.5	84.0	5.7	-0.5	94.6	78.4
E3	magenta	83.0	9.3	52.5	54.8	47.7	49.2	-13.9	-22.8
F3	cyan	97.5	2.8	51.7	54.0	-29.0	-27.9	-29.2	-30.3
A4	white	76.8	2.8	94.5	95.2	0.2	0.2	3.1	0.4
B4	neutral 8	86.6	2.3	80.5	82.1	-0.1	-0.2	1.2	-0.6
C4	neutral 6.5	74.2	3.8	67.5	69.9	0.3	0.8	0.2	-2.7
D4	neutral 5	57.5	5.4	52.3	55.2	0.5	1.5	-0.2	-4.7
E4	neutral 3.5	72.5	4.2	39.0	41.8	0.6	1.3	-1.2	-4.3
F4	black	100.0	2.3	26.5	28.8	0.7	0.8	-1.0	-1.0
A5	paper white	99.8	0.8	97.6	98.2	0.5	0.1	1.4	1.0
B5	Skin highlight L*=88	21.2	15.3	86.8	88.6	13.6	15.2	12.8	-2.4
C5	Skin highlight L* =75	22.3	20.7	74.6	77.7	19.5	20.9	16.8	-3.7
D5	Skin shadow L*=28	58.5	11.6	30.2	32.8	19.1	20.9	17.7	6.5
E5	Skin shadow L*=13	84.7	4.2	22.7	24.5	15.6	16.9	15.0	11.4
F5	Maximum Black	100.0	2.1	12.0	14.1	0.0	0.1	0.1	0.3

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	67.7	91.4	12.2
Worst 10% (3 lowest scoring patches)	20.5	82.4	38.2

180 Megalux hours

Epson Stylus Pro 3880, Epson OEM UltraChrome K3 with Vivid Magenta, Hahnemuhle Photo Rag Pearl 320gsm, no additional coating



Original Print Colors before light exposure

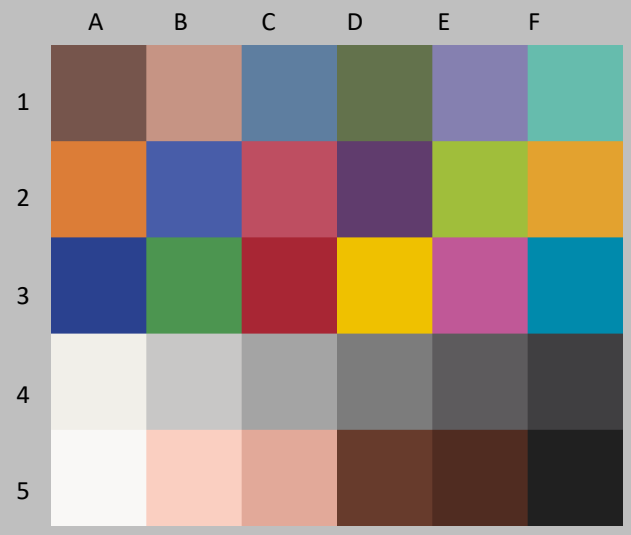
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	18.3	15.0	39.5	43.1	12.8	15.2	11.5	-2.9
B1	Light Skin	11.7	21.8	65.8	69.7	17.5	20.2	16.0	-5.3
C1	Blue sky	92.6	4.1	51.4	54.9	-4.7	-3.8	-21.9	-23.9
D1	Foliage	45.8	12.7	46.0	48.7	-11.0	-9.1	19.1	6.8
E1	blue flower	87.8	5.4	55.3	59.2	10.0	11.0	-24.8	-28.4
F1	bluish green	54.7	14.3	70.6	72.7	-30.0	-25.4	-1.1	-14.4
A1	orange	34.3	41.9	62.5	66.0	34.4	35.6	52.6	10.8
B2	purplish blue	94.3	4.4	40.7	43.9	9.6	11.0	-43.8	-46.5
C2	moderate red	51.9	23.9	49.0	51.6	46.7	50.3	12.9	-10.6
D2	purple	80.1	7.5	31.5	34.8	22.8	25.8	-21.8	-27.9
E2	yellow green	32.4	44.0	72.9	77.3	-23.7	-20.7	59.4	15.8
F2	orange yellow	33.7	45.5	71.8	75.7	18.4	18.1	65.1	19.7
A3	blue	100.0	2.8	29.3	32.1	13.4	13.4	-47.4	-47.9
B3	green	39.3	28.6	55.7	59.1	-35.3	-30.3	29.5	1.5
C3	red	71.1	17.6	38.6	40.4	52.8	55.9	25.8	8.5
D3	yellow	76.7	22.9	80.5	84.3	5.7	-0.6	94.6	72.9
E3	magenta	83.1	9.2	52.5	54.9	47.7	49.3	-13.9	-22.7
F3	cyan	97.2	2.9	51.7	54.1	-29.0	-27.6	-29.2	-30.1
A4	white	76.8	2.8	94.5	95.0	0.2	0.3	3.1	0.4
B4	neutral 8	86.0	2.3	80.5	82.0	-0.1	-0.1	1.2	-0.6
C4	neutral 6.5	71.9	4.0	67.5	69.9	0.3	0.9	0.2	-2.9
D4	neutral 5	53.8	5.8	52.3	55.4	0.5	1.7	-0.2	-5.0
E4	neutral 3.5	70.0	4.5	39.0	42.0	0.6	1.5	-1.2	-4.4
F4	black	100.0	2.4	26.5	29.0	0.7	0.9	-1.0	-1.0
A5	paper white	100.0	0.6	97.6	98.0	0.5	0.2	1.4	1.1
B5	Skin highlight L*=88	17.7	15.9	86.8	88.5	13.6	15.4	12.8	-3.0
C5	Skin highlight L* =75	18.0	21.8	74.6	77.6	19.5	21.1	16.8	-4.8
D5	Skin shadow L*=28	52.0	13.3	30.2	33.0	19.1	21.3	17.7	4.9
E5	Skin shadow L*=13	81.2	5.0	22.7	24.6	15.6	17.1	15.0	10.6
F5	Maximum Black	100.0	2.0	12.0	14.0	0.0	0.3	0.1	0.3

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	64.4	90.8	13.5
Worst 10% (3 lowest scoring patches)	15.8	81.3	43.8

200 Megalux hours

This test had been completed - no more updates



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			39.5		12.8		11.5	
B1	Light Skin			65.8		17.5		16.0	
C1	Blue sky			51.4		-4.7		-21.9	
D1	Foliage			46.0		-11.0		19.1	
E1	blue flower			55.3		10.0		-24.8	
F1	bluish green			70.6		-30.0		-1.1	
A1	orange			62.5		34.4		52.6	
B2	purplish blue			40.7		9.6		-43.8	
C2	moderate red			49.0		46.7		12.9	
D2	purple			31.5		22.8		-21.8	
E2	yellow green			72.9		-23.7		59.4	
F2	orange yellow			71.8		18.4		65.1	
A3	blue			29.3		13.4		-47.4	
B3	green			55.7		-35.3		29.5	
C3	red			38.6		52.8		25.8	
D3	yellow			80.5		5.7		94.6	
E3	magenta			52.5		47.7		-13.9	
F3	cyan			51.7		-29.0		-29.2	
A4	white			94.5		0.2		3.1	
B4	neutral 8			80.5		-0.1		1.2	
C4	neutral 6.5			67.5		0.3		0.2	
D4	neutral 5			52.3		0.5		-0.2	
E4	neutral 3.5			39.0		0.6		-1.2	
F4	black			26.5		0.7		-1.0	
A5	paper white			97.6		0.5		1.4	
B5	Skin highlight L*=88			86.8		13.6		12.8	
C5	Skin highlight L* =75			74.6		19.5		16.8	
D5	Skin shadow L*=28			30.2		19.1		17.7	
E5	Skin shadow L*=13			22.7		15.6		15.0	
F5	Maximum Black			12.0		0.0		0.1	

Summary Results	I* Color	I* tone	ΔE	> 200 Mlux hours
Average Score for all patches				
Worst 10% (3 lowest scoring patches)				