Aardenburg
144



IMAGING & ARCHIVES

Tested System:
ID#:291

Printer: HP Designjet Z3100 44"

Inks/Colorants: HP OEM 12-ink Vivera Pigment for Z3100

Media: Breathing Color Chromata White™ Canvas

Coating(s): Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)

Sample #: AaI_20091015_SN016

Testing Status: 160 Megalux hours total light exposure

Testing Is ongoing, next update on approximately OCT 05, 2014

Conservation Display Rating (CDR)

Lower limit: 148 Megalux hours (for weakest 10% of the color patches)
Upper limit: passing – evaluation is ongoing

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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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_20091015_SN016** **Batch #:** i1a
Printer: HP Designjet Z3100 44"
Ink: HP OEM 12-ink Vivera Pigment for Z3100
Media: Breathing Color Chromata White™ Canvas
Coating(s): Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)

Test Print Prepared by: AaI&A member
Printed: October 15, 2009
Initial Print colors measured September 19, 2010
Test Started: September 19, 2010

Test Image: AaI_StandardColorSet(v2)forSRGB.tif
RIP?Driver settings: PSCS4, HP OEM driver/Mac OSX, no color adjustment

Media Setting fineart canvas

Profile: Z3100BCChromata **Rendering** relative
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
	95.0	95.2	0.6	0.6	2.4	2.2
	UV-inc/UV-exc ΔL*, Δa*, Δb* respectively					
	0.2		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)		
	17.8	0.4	0.6	1.61		

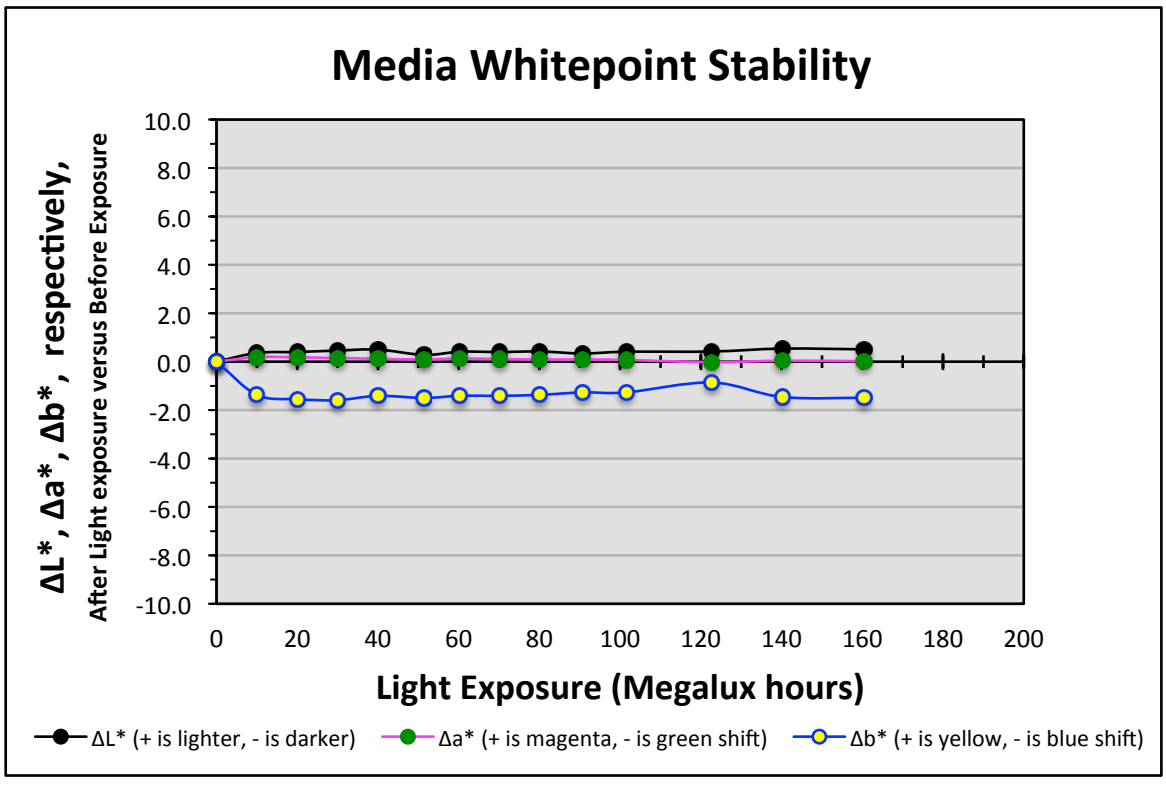
Light source: Phillips Colortone F40T12/C50 – 5000˚K full spectrum fluorescent. Color rendering Index (CRI) =92), soda lime glass filtered
Light Exposure Cycle: 8 hours on, 4 hours off, twice per 24 hours
CIELAB measurements: D50 2˚ observer, Xrite Gretag/Macbeth Spectrolino/Spectroscan

Average Illuminance during "on" cycle: 11254 Lux
Average Temperature: 23.3˚C over full test duration, 24.7˚C during light exposure.
Average Relative humidity: 56.7%RH over full test duration, 56.5%RH during light exposure.

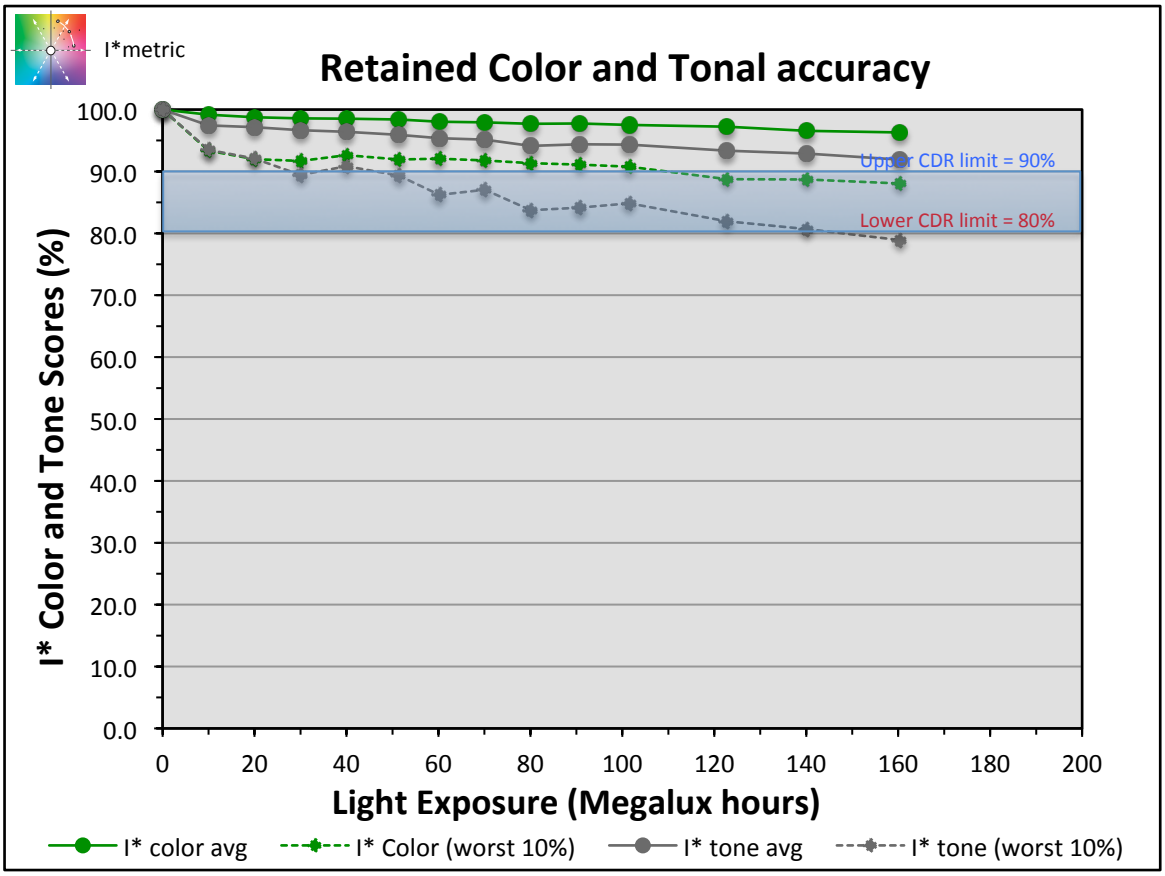
Notes/Comments:

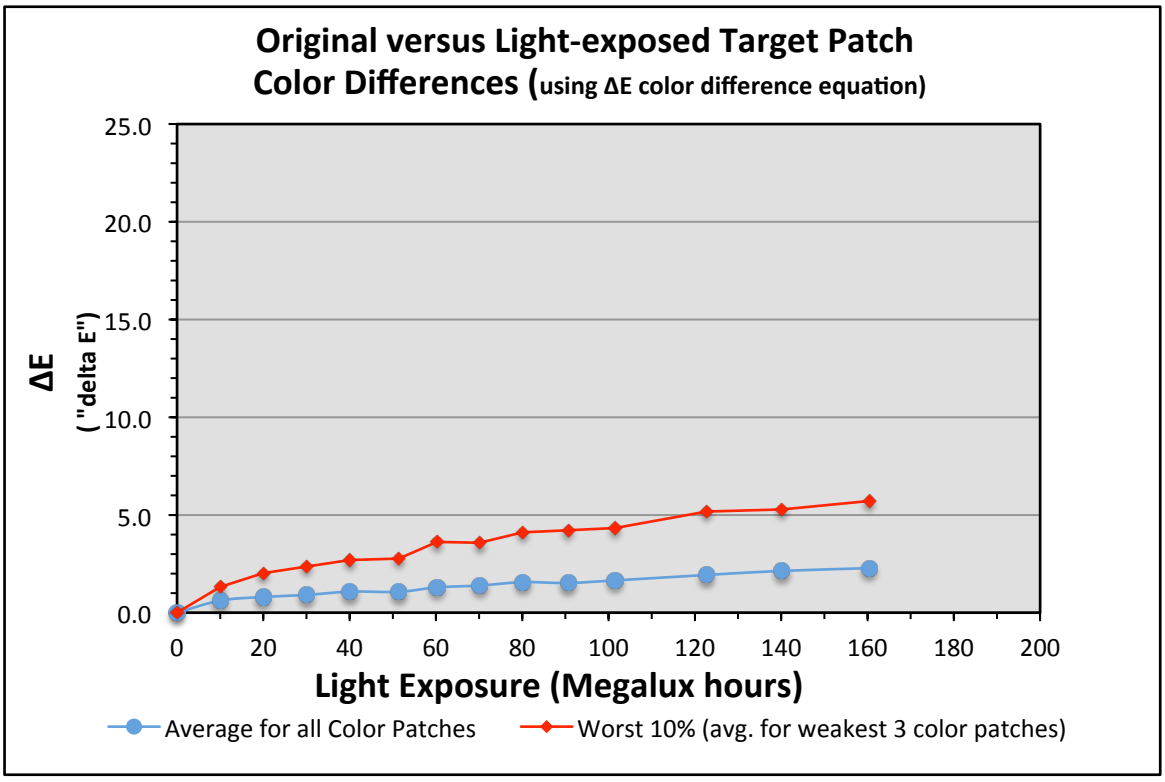
Graphs:

HP Designjet Z3100 44", HP OEM 12-ink Vivera Pigment for Z3100, Breathing Color Chromata White™ Canvas, Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)



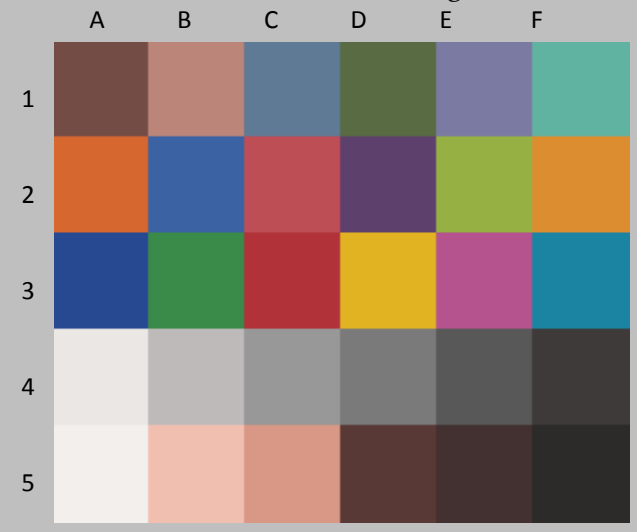
HP Designjet Z3100 44", HP OEM 12-ink Vivera Pigment for Z3100, Breathing Color Chromata White™ Canvas, Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)



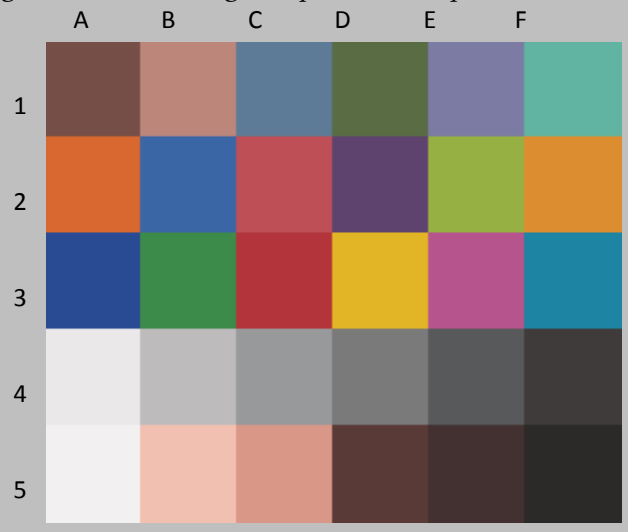


Values:

HP Designjet Z3100 44", HP OEM 12-ink Vivera Pigment for Z3100, Breathing Color Chromata White™ Canvas, Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)



Original Print Colors before light exposure



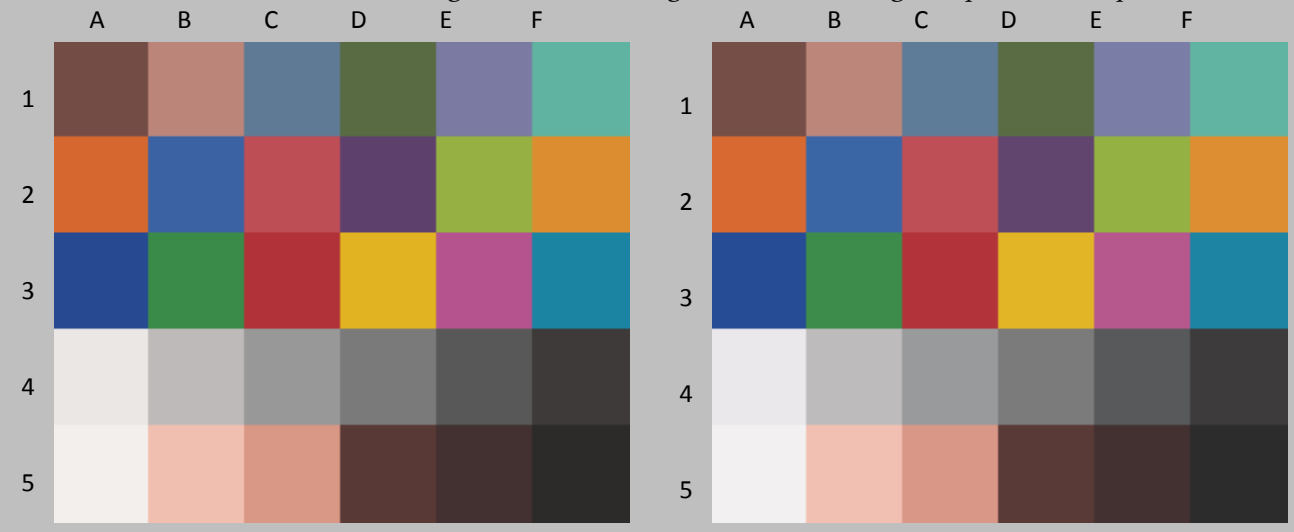
Colors After light exposure

				L*		a*		b*	
Patch #	Description	I* Color	ΔE	Before	After	Before	After	Before	After
A1	Dark Skin	100.0	0.7	36.7	37.4	16.6	16.4	10.6	10.6
B1	Light Skin	100.0	0.3	60.9	61.0	19.6	19.8	15.3	15.3
C1	Blue sky	100.0	0.5	49.9	50.1	-5.4	-5.8	-18.2	-18.4
D1	Foliage	100.0	0.2	42.8	43.0	-12.7	-12.7	20.2	20.2
E1	blue flower	99.4	0.8	52.6	53.0	7.2	6.6	-22.2	-22.2
F1	bluish green	99.8	0.7	67.4	67.9	-30.0	-29.8	1.2	0.6
A1	orange	100.0	0.3	57.0	57.2	42.4	42.6	50.9	51.0
B2	purplish blue	99.2	1.0	41.6	42.2	2.0	1.2	-40.1	-39.8
C2	moderate red	100.0	0.7	48.5	49.0	45.7	45.7	18.8	19.3
D2	purple	99.0	1.1	32.1	32.9	19.8	19.3	-21.3	-20.7
E2	yellow green	100.0	0.2	68.2	68.4	-21.3	-21.5	51.0	51.0
F2	orange yellow	100.0	0.2	65.8	66.0	25.8	25.8	59.4	59.4
A3	blue	99.5	1.1	31.8	32.6	8.2	7.6	-45.3	-44.9
B3	green	100.0	0.4	51.6	51.9	-36.7	-36.4	26.7	26.6
C3	red	100.0	0.8	41.6	42.3	51.8	51.8	27.6	28.0
D3	yellow	100.0	0.4	75.6	75.9	8.5	8.3	71.6	71.5
E3	magenta	98.7	1.3	49.5	50.1	45.0	44.6	-13.3	-12.3
F3	cyan	100.0	0.6	50.7	50.9	-21.5	-21.5	-24.7	-25.2
A4	white	92.3	1.3	91.8	92.1	1.0	1.1	0.8	-0.5
B4	neutral 8	97.1	0.9	75.7	76.1	0.7	0.9	0.8	0.0
C4	neutral 6.5	100.0	0.5	62.9	63.2	0.1	0.1	-0.3	-0.7
D4	neutral 5	100.0	0.4	51.2	51.5	0.4	0.4	0.2	-0.1
E4	neutral 3.5	100.0	0.3	37.3	37.6	0.3	0.3	-0.5	-0.6
F4	black	100.0	0.4	24.7	25.2	0.6	0.6	0.5	0.6
A5	paper white	90.7	1.4	94.4	94.8	0.9	1.1	1.2	-0.2
B5	Skin highlight L*=88	99.2	0.8	81.5	81.9	17.3	17.3	15.3	14.6
C5	Skin highlight L* =75	100.0	0.3	68.7	68.9	24.2	24.4	19.6	19.4
D5	Skin shadow L*=28	100.0	0.2	28.0	28.1	14.3	14.3	7.7	7.9
E5	Skin shadow L*=13	100.0	0.6	22.4	21.9	9.2	9.5	3.0	3.2
F5	Maximum Black	100.0	0.4	17.8	17.4	0.4	0.5	0.6	0.6

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	99.2	97.4	0.6
Worst 10% (3 lowest scoring patches)	93.4	93.5	1.3

10 Megalux hours

HP Designjet Z3100 44", HP OEM 12-ink Vivera Pigment for Z3100, Breathing Color Chromata White™ Canvas, Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)



Original Print Colors before light exposure

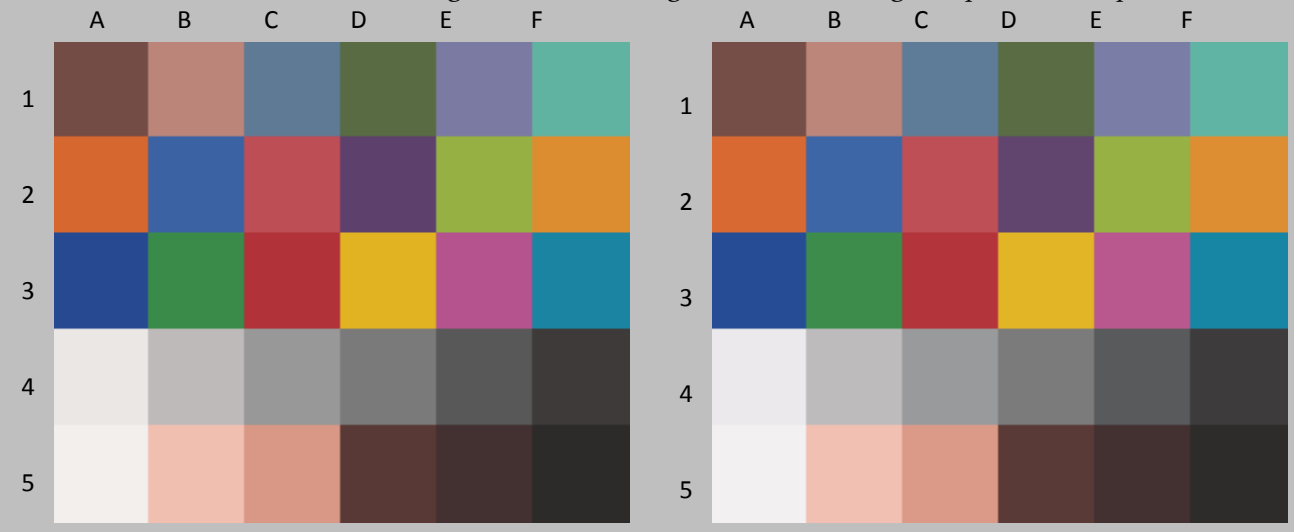
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	100.0	0.7	36.7	37.4	16.6	16.4	10.6	10.7
B1	Light Skin	100.0	0.3	60.9	61.1	19.6	19.8	15.3	15.2
C1	Blue sky	100.0	0.8	49.9	50.5	-5.4	-5.9	-18.2	-18.1
D1	Foliage	100.0	0.2	42.8	43.0	-12.7	-12.7	20.2	20.1
E1	blue flower	98.3	1.2	52.6	53.3	7.2	6.4	-22.2	-21.9
F1	bluish green	99.3	0.8	67.4	67.8	-30.0	-29.7	1.2	0.5
A1	orange	100.0	0.6	57.0	57.5	42.4	42.5	50.9	50.5
B2	purplish blue	98.5	1.3	41.6	42.3	2.0	1.0	-40.1	-39.7
C2	moderate red	99.7	0.9	48.5	49.2	45.7	45.6	18.8	19.5
D2	purple	96.3	2.1	32.1	33.6	19.8	18.8	-21.3	-20.1
E2	yellow green	100.0	0.3	68.2	68.4	-21.3	-21.5	51.0	50.9
F2	orange yellow	100.0	0.6	65.8	66.1	25.8	25.7	59.4	59.0
A3	blue	99.2	1.2	31.8	32.6	8.2	7.4	-45.3	-44.8
B3	green	100.0	0.5	51.6	52.0	-36.7	-36.4	26.7	26.6
C3	red	99.7	0.8	41.6	42.1	51.8	51.9	27.6	28.3
D3	yellow	100.0	0.6	75.6	76.0	8.5	8.3	71.6	71.2
E3	magenta	96.9	2.3	49.5	50.7	45.0	44.0	-13.3	-11.6
F3	cyan	100.0	0.6	50.7	51.1	-21.5	-21.4	-24.7	-25.2
A4	white	90.8	1.5	91.8	92.3	1.0	1.1	0.8	-0.6
B4	neutral 8	96.9	0.9	75.7	76.1	0.7	0.8	0.8	0.0
C4	neutral 6.5	100.0	0.7	62.9	63.4	0.1	0.1	-0.3	-0.7
D4	neutral 5	100.0	0.5	51.2	51.6	0.4	0.4	0.2	-0.1
E4	neutral 3.5	100.0	0.5	37.3	37.8	0.3	0.3	-0.5	-0.7
F4	black	100.0	0.5	24.7	25.2	0.6	0.6	0.5	0.4
A5	paper white	88.8	1.6	94.4	94.8	0.9	1.1	1.2	-0.4
B5	Skin highlight L*=88	98.1	1.1	81.5	82.0	17.3	17.2	15.3	14.3
C5	Skin highlight L* =75	100.0	0.6	68.7	69.2	24.2	24.2	19.6	19.2
D5	Skin shadow L*=28	100.0	0.2	28.0	28.1	14.3	14.2	7.7	7.9
E5	Skin shadow L*=13	100.0	0.2	22.4	22.3	9.2	9.2	3.0	3.1
F5	Maximum Black	100.0	0.2	17.8	17.9	0.4	0.4	0.6	0.5

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	98.8	97.2	0.8
Worst 10% (3 lowest scoring patches)	92.0	92.1	2.0

20 Megalux hours

HP Designjet Z3100 44", HP OEM 12-ink Vivera Pigment for Z3100, Breathing Color Chromata White™ Canvas, Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)



Original Print Colors before light exposure

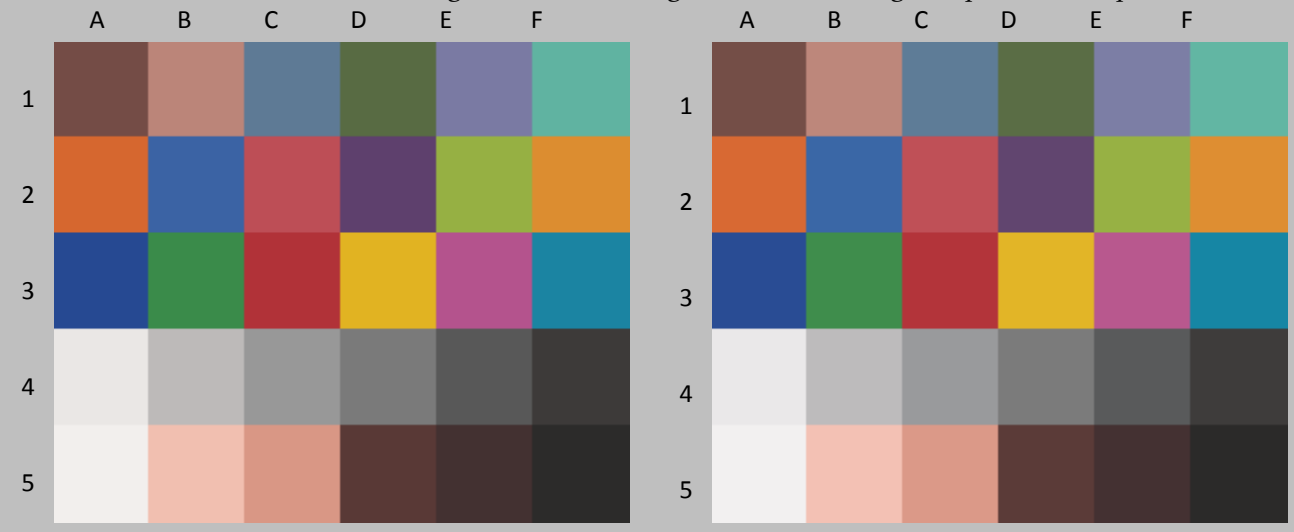
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	100.0	0.6	36.7	37.3	16.6	16.4	10.6	10.7
B1	Light Skin	100.0	0.4	60.9	61.3	19.6	19.8	15.3	15.3
C1	Blue sky	99.4	0.9	49.9	50.6	-5.4	-6.0	-18.2	-18.0
D1	Foliage	100.0	0.5	42.8	43.2	-12.7	-12.6	20.2	20.0
E1	blue flower	97.2	1.5	52.6	53.5	7.2	6.2	-22.2	-21.7
F1	bluish green	99.2	0.9	67.4	67.9	-30.0	-29.8	1.2	0.5
A1	orange	99.9	0.8	57.0	57.6	42.4	42.4	50.9	50.4
B2	purplish blue	97.6	1.7	41.6	42.5	2.0	0.8	-40.1	-39.3
C2	moderate red	99.5	1.0	48.5	49.2	45.7	45.7	18.8	19.6
D2	purple	95.8	2.4	32.1	33.8	19.8	18.8	-21.3	-19.9
E2	yellow green	100.0	0.3	68.2	68.5	-21.3	-21.5	51.0	51.0
F2	orange yellow	100.0	0.5	65.8	66.2	25.8	25.7	59.4	59.1
A3	blue	98.9	1.3	31.8	32.6	8.2	7.3	-45.3	-44.7
B3	green	100.0	0.4	51.6	52.0	-36.7	-36.5	26.7	26.7
C3	red	99.8	0.9	41.6	42.3	51.8	51.7	27.6	28.2
D3	yellow	100.0	0.6	75.6	76.0	8.5	8.1	71.6	71.3
E3	magenta	95.8	2.9	49.5	51.1	45.0	43.6	-13.3	-11.3
F3	cyan	99.9	0.8	50.7	51.2	-21.5	-21.5	-24.7	-25.2
A4	white	90.8	1.5	91.8	92.4	1.0	1.0	0.8	-0.6
B4	neutral 8	97.1	0.9	75.7	76.2	0.7	0.8	0.8	0.0
C4	neutral 6.5	100.0	0.7	62.9	63.5	0.1	0.1	-0.3	-0.7
D4	neutral 5	100.0	0.5	51.2	51.6	0.4	0.4	0.2	-0.1
E4	neutral 3.5	100.0	0.8	37.3	38.1	0.3	0.3	-0.5	-0.6
F4	black	100.0	0.4	24.7	25.1	0.6	0.6	0.5	0.4
A5	paper white	88.5	1.7	94.4	94.9	0.9	1.1	1.2	-0.4
B5	Skin highlight L*=88	97.7	1.2	81.5	82.0	17.3	17.1	15.3	14.2
C5	Skin highlight L* =75	100.0	0.7	68.7	69.3	24.2	24.2	19.6	19.2
D5	Skin shadow L*=28	100.0	0.2	28.0	28.1	14.3	14.2	7.7	7.9
E5	Skin shadow L*=13	100.0	0.1	22.4	22.4	9.2	9.2	3.0	3.1
F5	Maximum Black	100.0	0.2	17.8	18.0	0.4	0.4	0.6	0.6

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	98.6	96.7	0.9
Worst 10% (3 lowest scoring patches)	91.7	89.4	2.4

30 Megalux hours

HP Designjet Z3100 44", HP OEM 12-ink Vivera Pigment for Z3100, Breathing Color Chromata White™ Canvas, Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)



Original Print Colors before light exposure

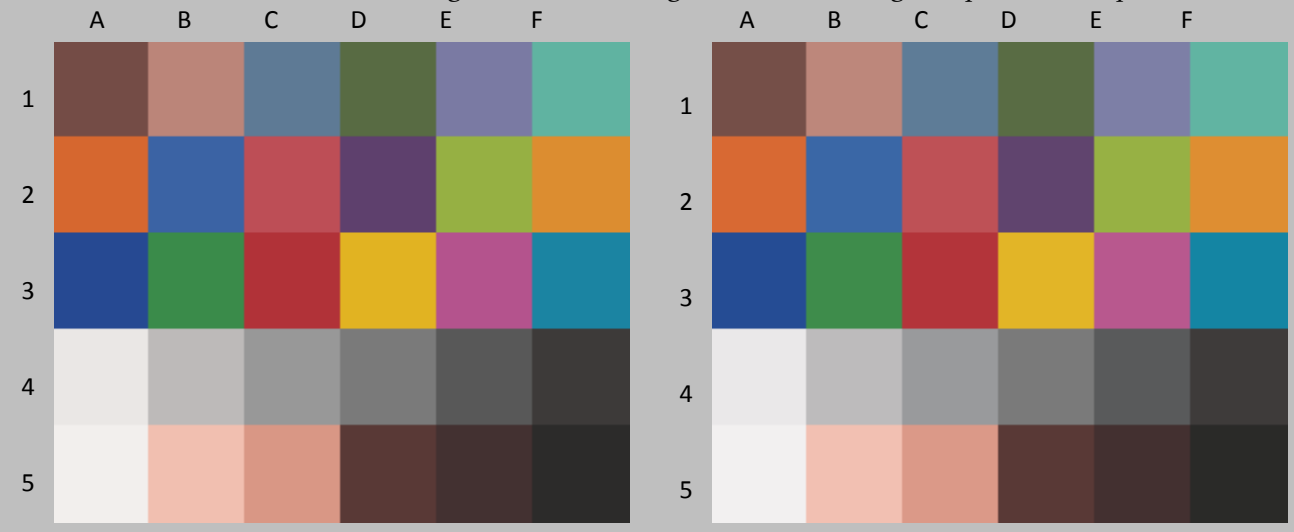
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	100.0	0.7	36.7	37.4	16.6	16.4	10.6	10.8
B1	Light Skin	100.0	0.5	60.9	61.4	19.6	19.7	15.3	15.3
C1	Blue sky	98.2	1.1	49.9	50.6	-5.4	-6.2	-18.2	-17.9
D1	Foliage	100.0	0.6	42.8	43.4	-12.7	-12.5	20.2	20.0
E1	blue flower	95.6	1.9	52.6	53.8	7.2	6.0	-22.2	-21.3
F1	bluish green	99.6	0.9	67.4	68.1	-30.0	-29.7	1.2	0.6
A1	orange	100.0	0.7	57.0	57.5	42.4	42.4	50.9	50.4
B2	purplish blue	96.1	2.4	41.6	42.8	2.0	0.4	-40.1	-38.8
C2	moderate red	99.5	1.2	48.5	49.4	45.7	45.5	18.8	19.6
D2	purple	95.0	2.6	32.1	33.9	19.8	18.7	-21.3	-19.7
E2	yellow green	100.0	0.5	68.2	68.6	-21.3	-21.4	51.0	50.8
F2	orange yellow	100.0	0.6	65.8	66.3	25.8	25.7	59.4	59.1
A3	blue	98.0	1.8	31.8	32.9	8.2	7.0	-45.3	-44.5
B3	green	99.9	0.9	51.6	52.4	-36.7	-36.2	26.7	26.6
C3	red	99.8	1.0	41.6	42.4	51.8	51.7	27.6	28.3
D3	yellow	99.6	0.9	75.6	76.1	8.5	8.2	71.6	70.9
E3	magenta	95.4	3.1	49.5	51.0	45.0	43.7	-13.3	-11.0
F3	cyan	100.0	0.7	50.7	51.3	-21.5	-21.7	-24.7	-25.0
A4	white	92.5	1.3	91.8	92.3	1.0	1.0	0.8	-0.4
B4	neutral 8	98.9	0.9	75.7	76.3	0.7	0.8	0.8	0.2
C4	neutral 6.5	100.0	0.7	62.9	63.5	0.1	0.0	-0.3	-0.6
D4	neutral 5	100.0	0.6	51.2	51.8	0.4	0.4	0.2	0.0
E4	neutral 3.5	100.0	0.8	37.3	38.1	0.3	0.2	-0.5	-0.6
F4	black	100.0	0.6	24.7	25.4	0.6	0.6	0.5	0.6
A5	paper white	90.4	1.5	94.4	94.9	0.9	1.0	1.2	-0.2
B5	Skin highlight L*=88	97.8	1.2	81.5	82.2	17.3	17.0	15.3	14.3
C5	Skin highlight L* =75	100.0	0.7	68.7	69.3	24.2	24.1	19.6	19.2
D5	Skin shadow L*=28	100.0	0.7	28.0	28.6	14.3	14.0	7.7	7.8
E5	Skin shadow L*=13	100.0	0.5	22.4	22.9	9.2	9.0	3.0	3.1
F5	Maximum Black	100.0	0.7	17.8	17.1	0.4	0.5	0.6	0.6

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	98.5	96.4	1.1
Worst 10% (3 lowest scoring patches)	92.6	90.8	2.7

40 Megalux hours

HP Designjet Z3100 44", HP OEM 12-ink Vivera Pigment for Z3100, Breathing Color Chromata White™ Canvas, Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)



Original Print Colors before light exposure

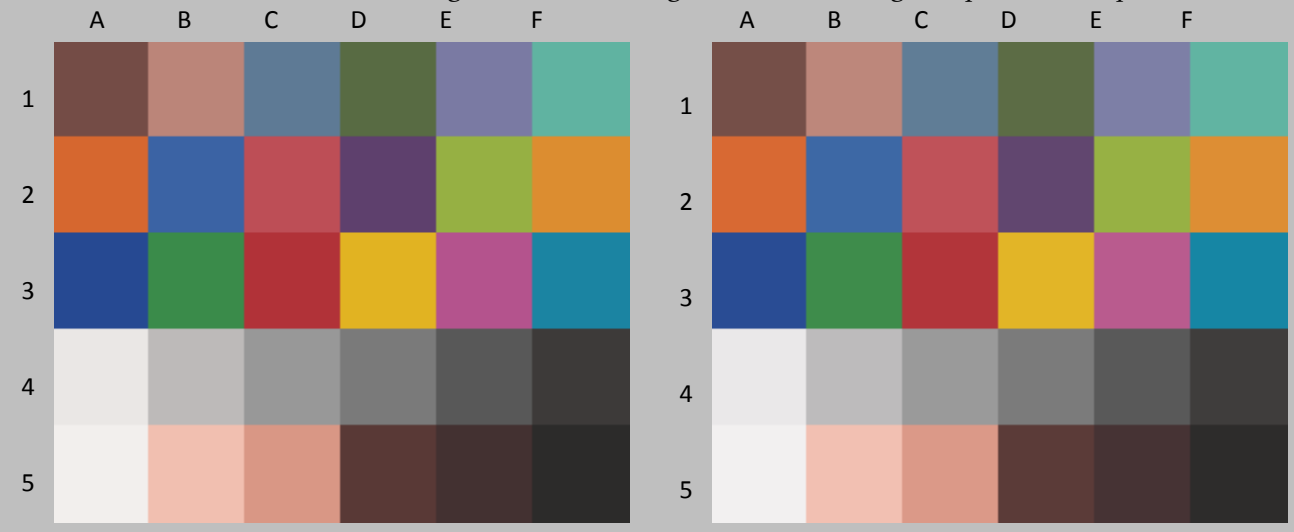
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	100.0	0.8	36.7	37.5	16.6	16.4	10.6	10.9
B1	Light Skin	100.0	0.6	60.9	61.5	19.6	19.6	15.3	15.2
C1	Blue sky	97.6	1.3	49.9	50.8	-5.4	-6.3	-18.2	-17.8
D1	Foliage	100.0	0.3	42.8	43.1	-12.7	-12.7	20.2	20.3
E1	blue flower	94.4	2.3	52.6	54.0	7.2	5.8	-22.2	-21.0
F1	bluish green	99.3	0.9	67.4	68.0	-30.0	-29.7	1.2	0.5
A1	orange	99.6	1.0	57.0	57.8	42.4	42.3	50.9	50.2
B2	purplish blue	95.5	2.6	41.6	42.8	2.0	0.2	-40.1	-38.7
C2	moderate red	99.3	1.3	48.5	49.6	45.7	45.5	18.8	19.7
D2	purple	95.9	2.2	32.1	33.5	19.8	19.0	-21.3	-19.8
E2	yellow green	100.0	0.5	68.2	68.6	-21.3	-21.4	51.0	50.8
F2	orange yellow	100.0	0.7	65.8	66.3	25.8	25.5	59.4	59.1
A3	blue	98.0	1.7	31.8	32.7	8.2	6.9	-45.3	-44.6
B3	green	100.0	0.7	51.6	52.2	-36.7	-36.3	26.7	26.7
C3	red	99.8	1.0	41.6	42.5	51.8	51.6	27.6	28.3
D3	yellow	99.7	0.8	75.6	76.0	8.5	8.0	71.6	71.0
E3	magenta	94.6	3.4	49.5	51.1	45.0	43.7	-13.3	-10.6
F3	cyan	100.0	0.7	50.7	51.1	-21.5	-21.8	-24.7	-25.1
A4	white	92.0	1.3	91.8	92.2	1.0	1.0	0.8	-0.5
B4	neutral 8	99.3	0.8	75.7	76.2	0.7	0.8	0.8	0.2
C4	neutral 6.5	100.0	0.6	62.9	63.5	0.1	0.0	-0.3	-0.6
D4	neutral 5	100.0	0.4	51.2	51.6	0.4	0.4	0.2	0.1
E4	neutral 3.5	100.0	0.6	37.3	38.0	0.3	0.2	-0.5	-0.6
F4	black	100.0	0.2	24.7	24.9	0.6	0.6	0.5	0.5
A5	paper white	89.4	1.5	94.4	94.7	0.9	1.0	1.2	-0.3
B5	Skin highlight L*=88	97.5	1.2	81.5	82.0	17.3	16.8	15.3	14.3
C5	Skin highlight L* =75	100.0	0.8	68.7	69.3	24.2	24.1	19.6	19.1
D5	Skin shadow L*=28	100.0	0.3	28.0	28.0	14.3	14.2	7.7	8.0
E5	Skin shadow L*=13	100.0	0.6	22.4	21.9	9.2	9.4	3.0	3.3
F5	Maximum Black	100.0	0.9	17.8	16.9	0.4	0.5	0.6	0.6

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	98.4	95.9	1.1
Worst 10% (3 lowest scoring patches)	91.9	89.3	2.8

50 Megalux hours

HP Designjet Z3100 44", HP OEM 12-ink Vivera Pigment for Z3100, Breathing Color Chromata White™ Canvas, Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)



Original Print Colors before light exposure

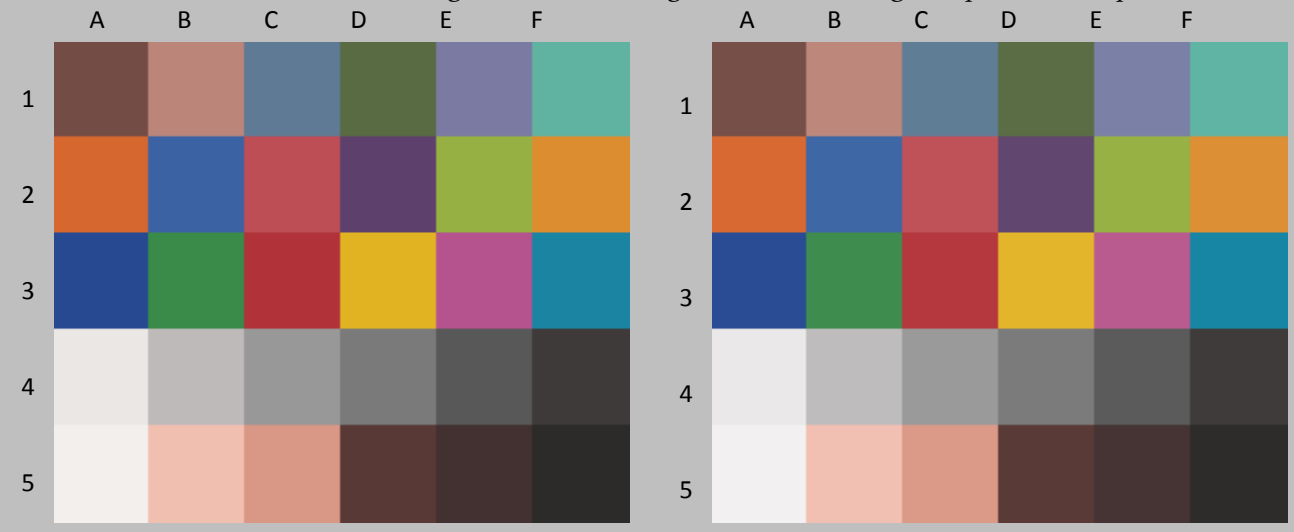
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	100.0	1.0	36.7	37.7	16.6	16.2	10.6	10.7
B1	Light Skin	100.0	0.5	60.9	61.4	19.6	19.6	15.3	15.2
C1	Blue sky	96.7	1.5	49.9	50.9	-5.4	-6.3	-18.2	-17.5
D1	Foliage	100.0	0.6	42.8	43.4	-12.7	-12.5	20.2	20.0
E1	blue flower	93.0	2.6	52.6	54.1	7.2	5.6	-22.2	-20.8
F1	bluish green	99.0	0.9	67.4	67.9	-30.0	-29.5	1.2	0.5
A1	orange	99.0	1.3	57.0	57.7	42.4	42.3	50.9	49.8
B2	purplish blue	94.2	3.2	41.6	43.1	2.0	0.0	-40.1	-38.1
C2	moderate red	99.5	1.3	48.5	49.6	45.7	45.2	18.8	19.4
D2	purple	92.9	3.3	32.1	34.2	19.8	18.3	-21.3	-19.2
E2	yellow green	100.0	0.5	68.2	68.6	-21.3	-21.4	51.0	50.6
F2	orange yellow	99.2	1.1	65.8	66.2	25.8	25.6	59.4	58.4
A3	blue	97.1	2.1	31.8	32.9	8.2	6.7	-45.3	-44.2
B3	green	99.8	0.8	51.6	52.2	-36.7	-36.1	26.7	26.6
C3	red	100.0	0.9	41.6	42.4	51.8	51.5	27.6	28.0
D3	yellow	99.4	1.1	75.6	76.1	8.5	8.0	71.6	70.7
E3	magenta	93.0	4.3	49.5	51.7	45.0	43.0	-13.3	-10.1
F3	cyan	100.0	0.7	50.7	51.3	-21.5	-21.7	-24.7	-24.8
A4	white	93.0	1.3	91.8	92.4	1.0	1.0	0.8	-0.4
B4	neutral 8	99.9	0.8	75.7	76.3	0.7	0.8	0.8	0.3
C4	neutral 6.5	100.0	0.7	62.9	63.6	0.1	0.1	-0.3	-0.4
D4	neutral 5	100.0	0.5	51.2	51.7	0.4	0.4	0.2	0.2
E4	neutral 3.5	100.0	0.5	37.3	37.8	0.3	0.2	-0.5	-0.5
F4	black	100.0	1.0	24.7	25.7	0.6	0.5	0.5	0.5
A5	paper white	90.4	1.5	94.4	94.8	0.9	1.0	1.2	-0.2
B5	Skin highlight L*=88	96.9	1.4	81.5	82.1	17.3	16.8	15.3	14.1
C5	Skin highlight L* =75	99.7	0.8	68.7	69.3	24.2	24.0	19.6	19.0
D5	Skin shadow L*=28	99.9	0.8	28.0	28.6	14.3	13.8	7.7	7.7
E5	Skin shadow L*=13	98.9	1.3	22.4	23.6	9.2	8.6	3.0	3.0
F5	Maximum Black	100.0	0.3	17.8	18.1	0.4	0.4	0.6	0.7

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	98.0	95.4	1.3
Worst 10% (3 lowest scoring patches)	92.1	86.2	3.6

60 Megalux hours

HP Designjet Z3100 44", HP OEM 12-ink Vivera Pigment for Z3100, Breathing Color Chromata White™ Canvas, Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)



Original Print Colors before light exposure

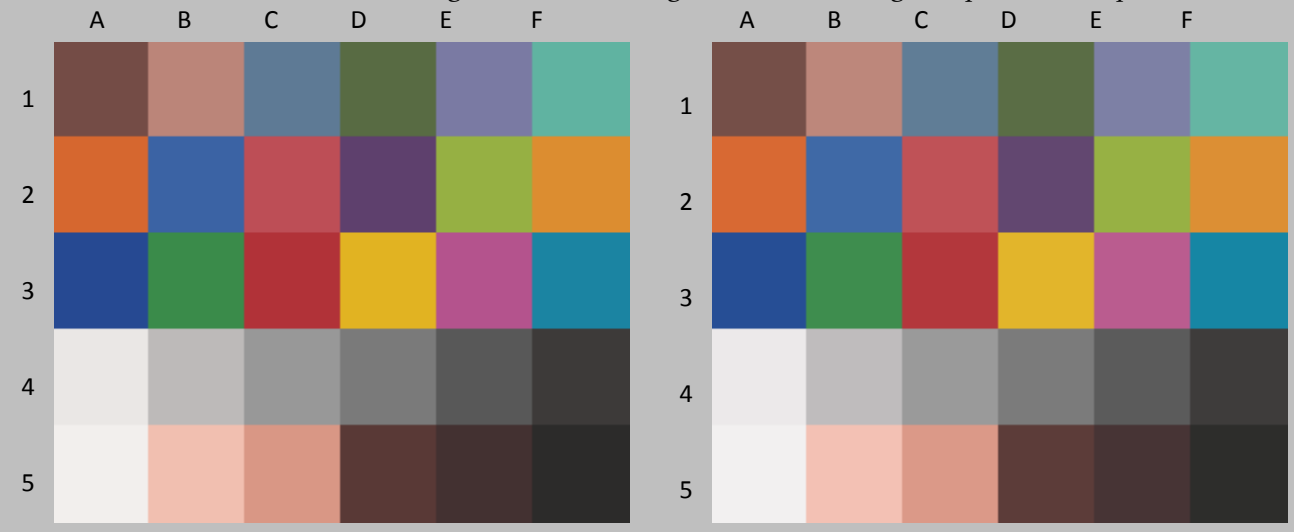
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	100.0	1.1	36.7	37.7	16.6	16.3	10.6	10.8
B1	Light Skin	100.0	0.7	60.9	61.7	19.6	19.6	15.3	15.2
C1	Blue sky	96.2	1.7	49.9	51.1	-5.4	-6.3	-18.2	-17.4
D1	Foliage	100.0	0.7	42.8	43.4	-12.7	-12.5	20.2	19.9
E1	blue flower	92.2	2.8	52.6	54.1	7.2	5.5	-22.2	-20.7
F1	bluish green	98.8	1.0	67.4	67.9	-30.0	-29.6	1.2	0.4
A1	orange	99.6	1.0	57.0	57.6	42.4	42.4	50.9	50.1
B2	purplish blue	94.2	3.2	41.6	43.0	2.0	-0.1	-40.1	-38.2
C2	moderate red	99.2	1.6	48.5	49.8	45.7	45.1	18.8	19.5
D2	purple	93.2	3.2	32.1	34.1	19.8	18.5	-21.3	-19.2
E2	yellow green	100.0	0.5	68.2	68.6	-21.3	-21.4	51.0	50.7
F2	orange yellow	99.0	1.2	65.8	66.3	25.8	25.5	59.4	58.3
A3	blue	96.7	2.3	31.8	33.0	8.2	6.6	-45.3	-44.0
B3	green	99.3	1.2	51.6	52.5	-36.7	-35.9	26.7	26.3
C3	red	99.1	1.7	41.6	43.0	51.8	50.8	27.6	27.3
D3	yellow	98.8	1.5	75.6	76.1	8.5	8.0	71.6	70.3
E3	magenta	92.8	4.4	49.5	51.6	45.0	43.2	-13.3	-9.9
F3	cyan	100.0	0.7	50.7	51.3	-21.5	-21.7	-24.7	-24.9
A4	white	93.1	1.3	91.8	92.4	1.0	1.0	0.8	-0.4
B4	neutral 8	99.5	0.8	75.7	76.3	0.7	0.8	0.8	0.2
C4	neutral 6.5	100.0	0.7	62.9	63.6	0.1	0.0	-0.3	-0.5
D4	neutral 5	100.0	0.6	51.2	51.8	0.4	0.4	0.2	0.0
E4	neutral 3.5	100.0	1.6	37.3	39.0	0.3	0.2	-0.5	-0.5
F4	black	100.0	0.5	24.7	25.2	0.6	0.6	0.5	0.6
A5	paper white	90.4	1.5	94.4	94.8	0.9	1.0	1.2	-0.2
B5	Skin highlight L*=88	96.7	1.4	81.5	82.1	17.3	16.8	15.3	14.1
C5	Skin highlight L* =75	99.1	1.1	68.7	69.5	24.2	23.9	19.6	18.9
D5	Skin shadow L*=28	100.0	0.5	28.0	28.3	14.3	13.9	7.7	7.8
E5	Skin shadow L*=13	100.0	1.1	22.4	23.4	9.2	8.7	3.0	3.0
F5	Maximum Black	100.0	0.2	17.8	18.0	0.4	0.5	0.6	0.6

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	97.9	95.2	1.4
Worst 10% (3 lowest scoring patches)	91.8	87.1	3.6

70 Megalux hours

HP Designjet Z3100 44", HP OEM 12-ink Vivera Pigment for Z3100, Breathing Color Chromata White™ Canvas, Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)



Original Print Colors before light exposure

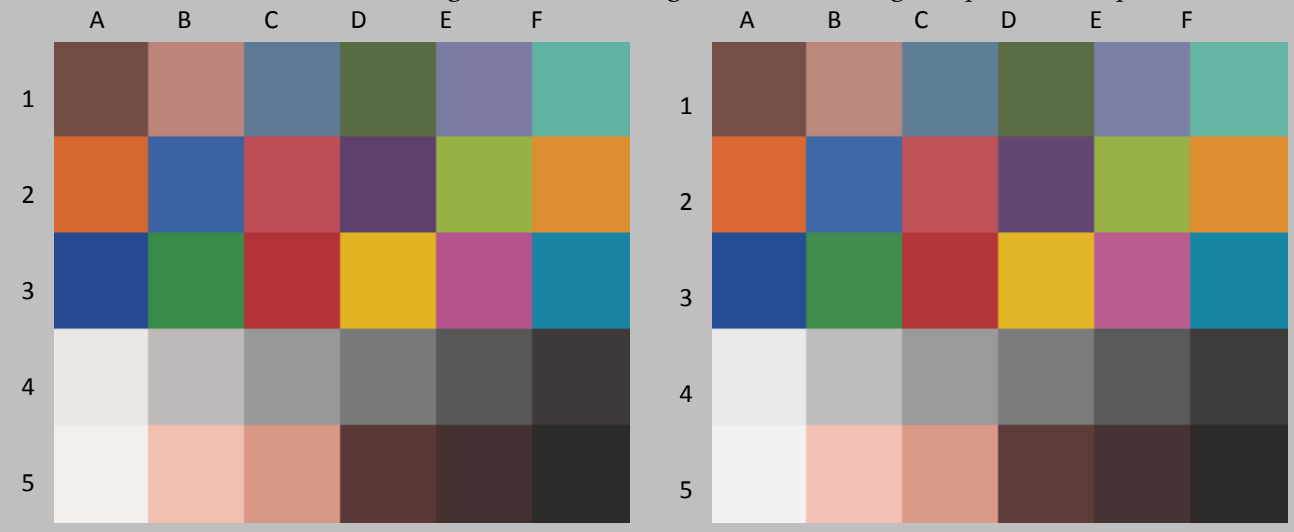
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	100.0	1.1	36.7	37.7	16.6	16.2	10.6	10.7
B1	Light Skin	100.0	0.8	60.9	61.7	19.6	19.5	15.3	15.1
C1	Blue sky	95.7	1.8	49.9	51.2	-5.4	-6.4	-18.2	-17.3
D1	Foliage	100.0	0.7	42.8	43.4	-12.7	-12.5	20.2	20.0
E1	blue flower	91.3	3.2	52.6	54.4	7.2	5.4	-22.2	-20.4
F1	bluish green	98.9	1.1	67.4	68.1	-30.0	-29.5	1.2	0.5
A1	orange	99.3	1.2	57.0	57.7	42.4	42.3	50.9	50.0
B2	purplish blue	93.2	3.7	41.6	43.4	2.0	-0.3	-40.1	-37.8
C2	moderate red	99.1	1.7	48.5	49.9	45.7	45.0	18.8	19.5
D2	purple	92.0	3.7	32.1	34.5	19.8	18.2	-21.3	-19.0
E2	yellow green	100.0	0.6	68.2	68.7	-21.3	-21.3	51.0	50.6
F2	orange yellow	98.9	1.3	65.8	66.3	25.8	25.4	59.4	58.2
A3	blue	95.9	2.8	31.8	33.4	8.2	6.4	-45.3	-43.7
B3	green	99.2	1.2	51.6	52.5	-36.7	-35.9	26.7	26.4
C3	red	99.5	1.5	41.6	42.9	51.8	51.0	27.6	27.5
D3	yellow	99.0	1.4	75.6	76.1	8.5	7.9	71.6	70.5
E3	magenta	91.9	4.9	49.5	52.0	45.0	42.8	-13.3	-9.7
F3	cyan	100.0	0.9	50.7	51.5	-21.5	-21.7	-24.7	-24.7
A4	white	93.7	1.2	91.8	92.4	1.0	1.0	0.8	-0.3
B4	neutral 8	100.0	0.9	75.7	76.4	0.7	0.8	0.8	0.3
C4	neutral 6.5	100.0	0.8	62.9	63.7	0.1	0.0	-0.3	-0.3
D4	neutral 5	100.0	0.6	51.2	51.8	0.4	0.4	0.2	0.2
E4	neutral 3.5	100.0	1.6	37.3	39.0	0.3	0.3	-0.5	-0.4
F4	black	100.0	0.6	24.7	25.4	0.6	0.6	0.5	0.6
A5	paper white	90.8	1.4	94.4	94.9	0.9	1.0	1.2	-0.2
B5	Skin highlight L*=88	96.2	1.6	81.5	82.3	17.3	16.7	15.3	14.0
C5	Skin highlight L* =75	99.3	1.1	68.7	69.5	24.2	23.9	19.6	19.0
D5	Skin shadow L*=28	98.9	1.2	28.0	29.0	14.3	13.6	7.7	7.6
E5	Skin shadow L*=13	98.0	1.6	22.4	23.9	9.2	8.6	3.0	2.9
F5	Maximum Black	100.0	0.6	17.8	18.4	0.4	0.4	0.6	0.6

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	97.7	94.1	1.6
Worst 10% (3 lowest scoring patches)	91.3	83.8	4.1

80 Megalux hours

HP Designjet Z3100 44", HP OEM 12-ink Vivera Pigment for Z3100, Breathing Color Chromata White™ Canvas, Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)



Original Print Colors before light exposure

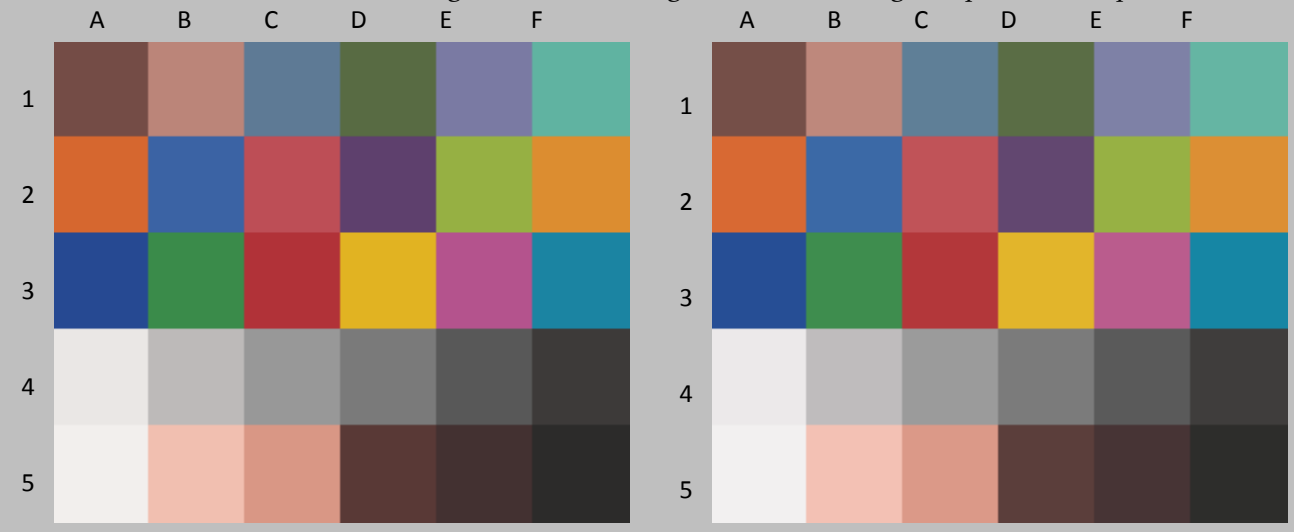
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	100.0	1.2	36.7	37.8	16.6	16.3	10.6	10.8
B1	Light Skin	100.0	0.8	60.9	61.8	19.6	19.5	15.3	15.2
C1	Blue sky	94.7	2.1	49.9	51.3	-5.4	-6.5	-18.2	-17.2
D1	Foliage	100.0	0.8	42.8	43.6	-12.7	-12.5	20.2	20.0
E1	blue flower	90.2	3.4	52.6	54.6	7.2	5.3	-22.2	-20.2
F1	bluish green	99.2	1.1	67.4	68.2	-30.0	-29.5	1.2	0.6
A1	orange	100.0	0.8	57.0	57.7	42.4	42.5	50.9	50.5
B2	purplish blue	93.0	3.8	41.6	43.4	2.0	-0.5	-40.1	-37.9
C2	moderate red	99.0	1.7	48.5	50.0	45.7	45.0	18.8	19.6
D2	purple	92.1	3.6	32.1	34.4	19.8	18.4	-21.3	-18.9
E2	yellow green	99.9	0.8	68.2	68.8	-21.3	-21.4	51.0	50.4
F2	orange yellow	99.3	1.1	65.8	66.4	25.8	25.5	59.4	58.5
A3	blue	96.0	2.7	31.8	33.1	8.2	6.3	-45.3	-43.9
B3	green	99.4	1.2	51.6	52.6	-36.7	-36.0	26.7	26.5
C3	red	99.7	1.3	41.6	42.8	51.8	51.1	27.6	27.7
D3	yellow	99.4	1.1	75.6	76.1	8.5	7.9	71.6	70.9
E3	magenta	91.2	5.3	49.5	52.1	45.0	42.7	-13.3	-9.3
F3	cyan	100.0	0.9	50.7	51.4	-21.5	-21.9	-24.7	-24.6
A4	white	94.5	1.1	91.8	92.3	1.0	1.0	0.8	-0.3
B4	neutral 8	100.0	0.7	75.7	76.3	0.7	0.8	0.8	0.4
C4	neutral 6.5	100.0	0.8	62.9	63.7	0.1	0.0	-0.3	-0.2
D4	neutral 5	100.0	0.6	51.2	51.9	0.4	0.4	0.2	0.3
E4	neutral 3.5	100.0	1.2	37.3	38.5	0.3	0.3	-0.5	-0.3
F4	black	100.0	0.9	24.7	25.7	0.6	0.6	0.5	0.5
A5	paper white	91.9	1.3	94.4	94.8	0.9	1.0	1.2	-0.1
B5	Skin highlight L*=88	96.1	1.6	81.5	82.3	17.3	16.6	15.3	14.0
C5	Skin highlight L* =75	99.5	1.0	68.7	69.5	24.2	23.9	19.6	19.0
D5	Skin shadow L*=28	98.7	1.2	28.0	29.0	14.3	13.6	7.7	7.6
E5	Skin shadow L*=13	98.9	1.3	22.4	23.6	9.2	8.6	3.0	3.0
F5	Maximum Black	100.0	0.2	17.8	17.7	0.4	0.5	0.6	0.7

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	97.8	94.4	1.5
Worst 10% (3 lowest scoring patches)	91.1	84.2	4.2

90 Megalux hours

HP Designjet Z3100 44", HP OEM 12-ink Vivera Pigment for Z3100, Breathing Color Chromata White™ Canvas, Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)



Original Print Colors before light exposure

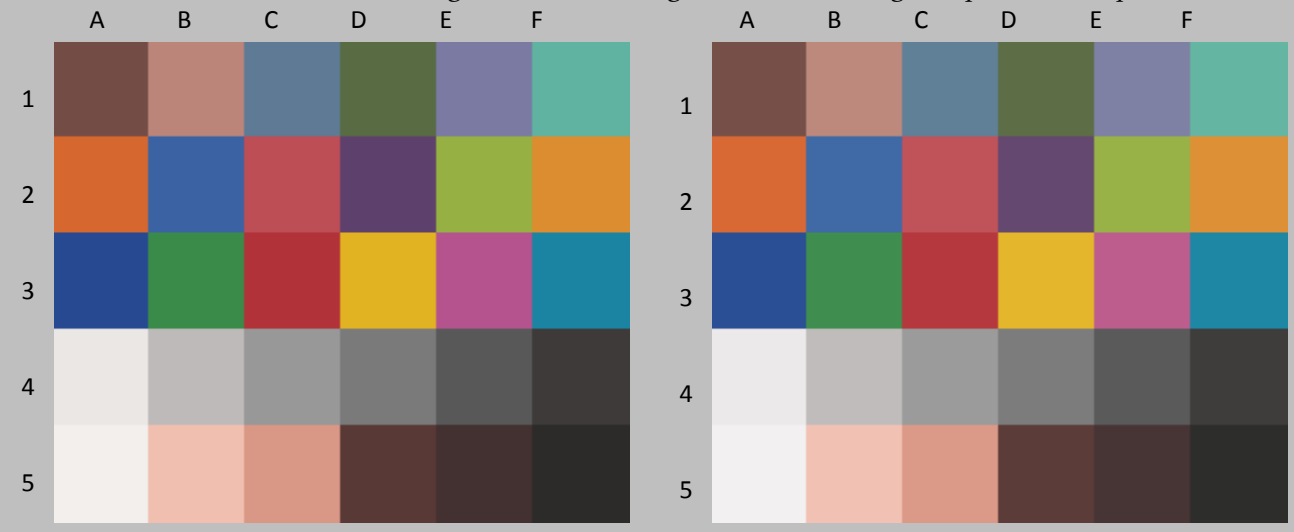
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	100.0	1.2	36.7	37.8	16.6	16.2	10.6	10.8
B1	Light Skin	100.0	0.9	60.9	61.8	19.6	19.5	15.3	15.1
C1	Blue sky	94.3	2.2	49.9	51.3	-5.4	-6.6	-18.2	-17.1
D1	Foliage	100.0	0.9	42.8	43.6	-12.7	-12.5	20.2	19.9
E1	blue flower	89.5	3.7	52.6	54.7	7.2	5.2	-22.2	-20.0
F1	bluish green	99.1	1.1	67.4	68.3	-30.0	-29.5	1.2	0.6
A1	orange	99.3	1.2	57.0	57.8	42.4	42.4	50.9	50.0
B2	purplish blue	92.6	4.0	41.6	43.5	2.0	-0.6	-40.1	-37.8
C2	moderate red	99.1	1.8	48.5	50.1	45.7	45.0	18.8	19.6
D2	purple	91.5	3.8	32.1	34.5	19.8	18.3	-21.3	-18.8
E2	yellow green	100.0	0.7	68.2	68.8	-21.3	-21.3	51.0	50.5
F2	orange yellow	98.5	1.6	65.8	66.4	25.8	25.4	59.4	58.0
A3	blue	95.6	2.9	31.8	33.3	8.2	6.2	-45.3	-43.7
B3	green	99.3	1.3	51.6	52.6	-36.7	-35.9	26.7	26.5
C3	red	99.8	1.2	41.6	42.7	51.8	51.2	27.6	27.7
D3	yellow	99.0	1.4	75.6	76.2	8.5	7.9	71.6	70.4
E3	magenta	91.3	5.2	49.5	52.0	45.0	42.9	-13.3	-9.2
F3	cyan	100.0	1.0	50.7	51.5	-21.5	-21.8	-24.7	-24.6
A4	white	94.6	1.2	91.8	92.4	1.0	0.9	0.8	-0.2
B4	neutral 8	100.0	0.8	75.7	76.4	0.7	0.8	0.8	0.5
C4	neutral 6.5	100.0	0.9	62.9	63.8	0.1	0.0	-0.3	-0.2
D4	neutral 5	100.0	0.7	51.2	51.9	0.4	0.4	0.2	0.3
E4	neutral 3.5	100.0	1.0	37.3	38.3	0.3	0.3	-0.5	-0.4
F4	black	100.0	1.0	24.7	25.7	0.6	0.6	0.5	0.5
A5	paper white	91.9	1.3	94.4	94.8	0.9	1.0	1.2	-0.1
B5	Skin highlight L*=88	96.1	1.6	81.5	82.4	17.3	16.6	15.3	14.0
C5	Skin highlight L* =75	99.2	1.1	68.7	69.6	24.2	23.9	19.6	18.9
D5	Skin shadow L*=28	97.4	1.6	28.0	29.4	14.3	13.4	7.7	7.4
E5	Skin shadow L*=13	97.7	1.6	22.4	23.9	9.2	8.5	3.0	3.0
F5	Maximum Black	100.0	0.5	17.8	18.3	0.4	0.5	0.6	0.6

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	97.5	94.4	1.7
Worst 10% (3 lowest scoring patches)	90.8	84.8	4.3

100 Megalux hours

HP Designjet Z3100 44", HP OEM 12-ink Vivera Pigment for Z3100, Breathing Color Chromata White™ Canvas, Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)



Original Print Colors before light exposure

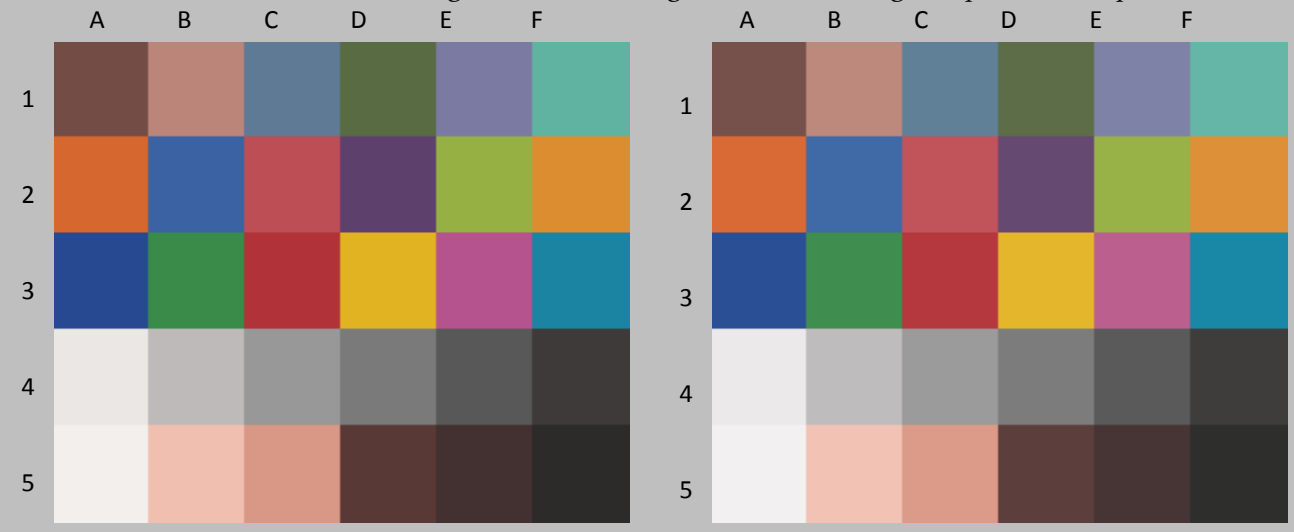
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	99.7	1.6	36.7	38.2	16.6	16.0	10.6	10.5
B1	Light Skin	100.0	1.1	60.9	62.0	19.6	19.4	15.3	15.0
C1	Blue sky	92.1	2.7	49.9	51.6	-5.4	-6.8	-18.2	-16.7
D1	Foliage	100.0	1.1	42.8	43.8	-12.7	-12.5	20.2	19.8
E1	blue flower	86.7	4.4	52.6	55.0	7.2	4.9	-22.2	-19.4
F1	bluish green	99.2	1.2	67.4	68.4	-30.0	-29.5	1.2	0.7
A1	orange	98.5	1.7	57.0	57.8	42.4	42.4	50.9	49.4
B2	purplish blue	90.4	4.9	41.6	43.9	2.0	-1.1	-40.1	-37.1
C2	moderate red	98.9	2.1	48.5	50.4	45.7	44.7	18.8	19.3
D2	purple	90.0	4.5	32.1	35.0	19.8	18.1	-21.3	-18.3
E2	yellow green	99.4	1.2	68.2	69.0	-21.3	-21.2	51.0	50.1
F2	orange yellow	98.2	1.9	65.8	66.6	25.8	25.3	59.4	57.8
A3	blue	94.3	3.6	31.8	33.6	8.2	5.7	-45.3	-43.3
B3	green	99.0	1.5	51.6	52.8	-36.7	-35.8	26.7	26.4
C3	red	99.4	1.6	41.6	43.0	51.8	50.9	27.6	27.4
D3	yellow	98.5	1.7	75.6	76.3	8.5	7.9	71.6	70.1
E3	magenta	89.6	6.1	49.5	52.5	45.0	42.6	-13.3	-8.5
F3	cyan	99.6	1.2	50.7	51.6	-21.5	-21.9	-24.7	-24.3
A4	white	98.9	0.9	91.8	92.4	1.0	0.8	0.8	0.2
B4	neutral 8	100.0	0.9	75.7	76.6	0.7	0.7	0.8	0.8
C4	neutral 6.5	100.0	0.9	62.9	63.8	0.1	-0.1	-0.3	-0.1
D4	neutral 5	100.0	0.8	51.2	52.0	0.4	0.3	0.2	0.4
E4	neutral 3.5	100.0	1.2	37.3	38.5	0.3	0.2	-0.5	-0.3
F4	black	100.0	1.0	24.7	25.7	0.6	0.5	0.5	0.6
A5	paper white	96.2	1.0	94.4	94.9	0.9	0.9	1.2	0.3
B5	Skin highlight L*=88	95.5	1.8	81.5	82.5	17.3	16.4	15.3	14.0
C5	Skin highlight L* =75	98.6	1.3	68.7	69.6	24.2	23.8	19.6	18.8
D5	Skin shadow L*=28	98.1	1.4	28.0	29.2	14.3	13.5	7.7	7.5
E5	Skin shadow L*=13	96.0	2.0	22.4	24.2	9.2	8.4	3.0	2.8
F5	Maximum Black	100.0	0.8	17.8	18.6	0.4	0.4	0.6	0.6

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	97.2	93.4	1.9
Worst 10% (3 lowest scoring patches)	88.7	82.0	5.2

120 Megalux hours

HP Designjet Z3100 44", HP OEM 12-ink Vivera Pigment for Z3100, Breathing Color Chromata White™ Canvas, Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)



Original Print Colors before light exposure

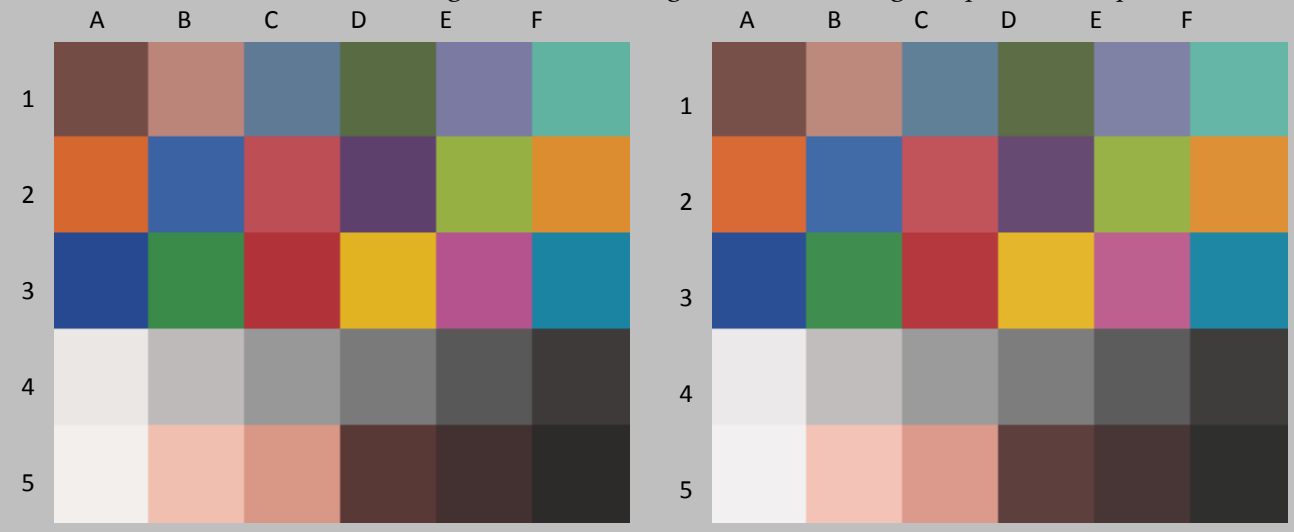
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	99.4	1.6	36.7	38.2	16.6	16.0	10.6	10.5
B1	Light Skin	100.0	1.2	60.9	62.1	19.6	19.4	15.3	14.9
C1	Blue sky	93.0	2.6	49.9	51.8	-5.4	-6.7	-18.2	-16.9
D1	Foliage	98.0	1.6	42.8	44.1	-12.7	-12.3	20.2	19.3
E1	blue flower	87.3	4.4	52.6	55.2	7.2	4.9	-22.2	-19.7
F1	bluish green	98.1	1.5	67.4	68.5	-30.0	-29.3	1.2	0.4
A1	orange	97.9	2.1	57.0	58.0	42.4	42.2	50.9	49.1
B2	purplish blue	91.3	4.7	41.6	44.0	2.0	-0.9	-40.1	-37.4
C2	moderate red	98.8	2.2	48.5	50.5	45.7	44.7	18.8	19.2
D2	purple	89.3	4.9	32.1	35.3	19.8	17.9	-21.3	-18.2
E2	yellow green	99.2	1.2	68.2	69.0	-21.3	-21.4	51.0	50.0
F2	orange yellow	97.5	2.4	65.8	66.8	25.8	25.2	59.4	57.3
A3	blue	94.7	3.6	31.8	33.8	8.2	5.8	-45.3	-43.5
B3	green	99.1	1.6	51.6	52.9	-36.7	-35.9	26.7	26.3
C3	red	99.4	1.6	41.6	43.0	51.8	51.0	27.6	27.4
D3	yellow	98.7	1.7	75.6	76.4	8.5	7.7	71.6	70.3
E3	magenta	89.5	6.3	49.5	52.8	45.0	42.3	-13.3	-8.6
F3	cyan	100.0	1.1	50.7	51.7	-21.5	-21.8	-24.7	-24.5
A4	white	93.4	1.4	91.8	92.6	1.0	0.9	0.8	-0.4
B4	neutral 8	100.0	1.0	75.7	76.6	0.7	0.8	0.8	0.4
C4	neutral 6.5	100.0	1.0	62.9	64.0	0.1	0.0	-0.3	-0.2
D4	neutral 5	100.0	1.0	51.2	52.2	0.4	0.4	0.2	0.3
E4	neutral 3.5	100.0	1.1	37.3	38.4	0.3	0.2	-0.5	-0.4
F4	black	100.0	1.3	24.7	26.0	0.6	0.6	0.5	0.5
A5	paper white	89.9	1.6	94.4	95.0	0.9	0.9	1.2	-0.3
B5	Skin highlight L*=88	93.8	2.3	81.5	82.7	17.3	16.4	15.3	13.5
C5	Skin highlight L* =75	97.9	1.6	68.7	69.8	24.2	23.7	19.6	18.5
D5	Skin shadow L*=28	95.7	2.2	28.0	29.8	14.3	13.2	7.7	7.2
E5	Skin shadow L*=13	95.3	2.3	22.4	24.5	9.2	8.3	3.0	2.9
F5	Maximum Black	100.0	1.2	17.8	19.0	0.4	0.4	0.6	0.6

Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	96.6	92.9	2.1
Worst 10% (3 lowest scoring patches)	88.7	80.7	5.3

140 Megalux hours

HP Designjet Z3100 44", HP OEM 12-ink Vivera Pigment for Z3100, Breathing Color Chromata White™ Canvas, Breathing Color Glamour II gloss/matte 2:1 (i.e., gloss 2 parts, matte 1part)



Original Print Colors before light exposure

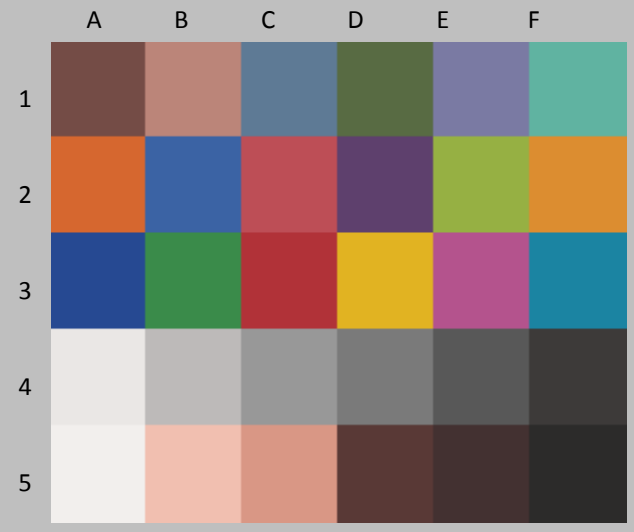
Colors After light exposure

Patch #	Description	I* Color	ΔE	L* Before	L* After	a* Before	a* After	b* Before	b* After
A1	Dark Skin	99.4	1.7	36.7	38.3	16.6	16.0	10.6	10.5
B1	Light Skin	99.8	1.3	60.9	62.1	19.6	19.3	15.3	14.8
C1	Blue sky	92.5	2.7	49.9	51.7	-5.4	-6.8	-18.2	-16.9
D1	Foliage	99.2	1.3	42.8	44.0	-12.7	-12.4	20.2	19.6
E1	blue flower	86.5	4.6	52.6	55.3	7.2	4.8	-22.2	-19.5
F1	bluish green	98.1	1.6	67.4	68.6	-30.0	-29.3	1.2	0.4
A1	orange	98.3	1.9	57.0	58.0	42.4	42.3	50.9	49.3
B2	purplish blue	90.1	5.3	41.6	44.4	2.0	-1.1	-40.1	-36.9
C2	moderate red	98.6	2.4	48.5	50.6	45.7	44.5	18.8	19.2
D2	purple	88.8	5.1	32.1	35.5	19.8	17.9	-21.3	-18.1
E2	yellow green	98.8	1.4	68.2	69.1	-21.3	-21.4	51.0	49.8
F2	orange yellow	97.7	2.2	65.8	66.8	25.8	25.2	59.4	57.5
A3	blue	94.2	3.8	31.8	33.9	8.2	5.6	-45.3	-43.4
B3	green	99.0	1.7	51.6	53.0	-36.7	-35.8	26.7	26.2
C3	red	99.2	1.8	41.6	43.2	51.8	50.8	27.6	27.3
D3	yellow	98.6	1.7	75.6	76.4	8.5	7.6	71.6	70.3
E3	magenta	88.8	6.8	49.5	53.2	45.0	42.1	-13.3	-8.4
F3	cyan	100.0	1.3	50.7	51.9	-21.5	-21.8	-24.7	-24.4
A4	white	93.7	1.3	91.8	92.5	1.0	0.9	0.8	-0.3
B4	neutral 8	100.0	1.1	75.7	76.7	0.7	0.7	0.8	0.5
C4	neutral 6.5	100.0	1.1	62.9	64.0	0.1	0.0	-0.3	-0.1
D4	neutral 5	100.0	1.2	51.2	52.4	0.4	0.4	0.2	0.4
E4	neutral 3.5	100.0	1.9	37.3	39.2	0.3	0.2	-0.5	-0.3
F4	black	100.0	1.0	24.7	25.8	0.6	0.6	0.5	0.6
A5	paper white	89.6	1.6	94.4	94.9	0.9	0.9	1.2	-0.3
B5	Skin highlight L*=88	92.7	2.5	81.5	82.8	17.3	16.2	15.3	13.3
C5	Skin highlight L* =75	97.4	1.8	68.7	69.9	24.2	23.6	19.6	18.4
D5	Skin shadow L*=28	93.9	2.5	28.0	30.0	14.3	12.9	7.7	7.1
E5	Skin shadow L*=13	94.1	2.4	22.4	24.6	9.2	8.2	3.0	2.9
F5	Maximum Black	100.0	1.3	17.8	19.1	0.4	0.4	0.6	0.6

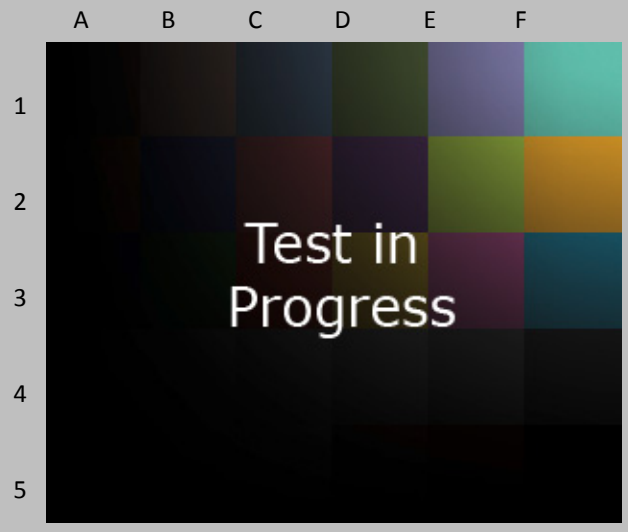
Summary Results	I* Color	I* tone	ΔE
Average Score for all patches	96.3	91.9	2.3
Worst 10% (3 lowest scoring patches)	88.0	78.9	5.7

160 Megalux hours

The 180 Megalux hour Update will be posted on approximately OCT 05, 2014.



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			36.7		16.6		10.6	
B1	Light Skin			60.9		19.6		15.3	
C1	Blue sky			49.9		-5.4		-18.2	
D1	Foliage			42.8		-12.7		20.2	
E1	blue flower			52.6		7.2		-22.2	
F1	bluish green			67.4		-30.0		1.2	
A1	orange			57.0		42.4		50.9	
B2	purplish blue			41.6		2.0		-40.1	
C2	moderate red			48.5		45.7		18.8	
D2	purple			32.1		19.8		-21.3	
E2	yellow green			68.2		-21.3		51.0	
F2	orange yellow			65.8		25.8		59.4	
A3	blue			31.8		8.2		-45.3	
B3	green			51.6		-36.7		26.7	
C3	red			41.6		51.8		27.6	
D3	yellow			75.6		8.5		71.6	
E3	magenta			49.5		45.0		-13.3	
F3	cyan			50.7		-21.5		-24.7	
A4	white			91.8		1.0		0.8	
B4	neutral 8			75.7		0.7		0.8	
C4	neutral 6.5			62.9		0.1		-0.3	
D4	neutral 5			51.2		0.4		0.2	
E4	neutral 3.5			37.3		0.3		-0.5	
F4	black			24.7		0.6		0.5	
A5	paper white			94.4		0.9		1.2	
B5	Skin highlight L*=88			81.5		17.3		15.3	
C5	Skin highlight L* =75			68.7		24.2		19.6	
D5	Skin shadow L*=28			28.0		14.3		7.7	
E5	Skin shadow L*=13			22.4		9.2		3.0	
F5	Maximum Black			17.8		0.4		0.6	

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

180 Megalux hours