

Aardenburg

144



IMAGING & ARCHIVES

Tested System:

ID#:275

Printer: Epson Stylus Photo 1400

Inks/Colorants: MIS Associates D2 Dyebase Ink set for Epson Claria Printers

Media: Red River Ultra Pro Satin 2.0 (68lb - 270gsm - 10.4 mil)

Coating(s): no additional coating

Sample #: AaI_20121030_SN003

Testing Status: 50 Megalux hours total light exposure

Testing is Complete (no more updates)

Conservation Display Rating (CDR)

Lower limit: 1.5 Megalux hours (for weakest 10% of the color patches)

Upper limit: 2.1 Megalux hours (for average of all the color patches)

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

* Please read document AaI_2009_0118_TA-01.pdf, “An Overview of the AaI&A Conservation Display Ratings”, located on the Documents page of the AaI&A website for further 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_20121030_SN003 **Batch #:** M1
Printer: Epson Stylus Photo 1400
Ink: MIS Associates D2 Dyebase Ink set for Epson Claria Printers
Media: Red River Ultra Pro Satin 2.0 (68lb - 270gsm - 10.4 mil)
Coating(s): no additional coating

Test Print Prepared by: AaI&A member
Printed: October 30, 2012
Initial Print colors measured February 17, 2013
Test Started: February 20, 2013

Test Image: AaI_StandardColorSet(v2)forSRGB.tif
RIP?Driver settings: Epson OEM driver (v 6.61), PSCS4, quality = "Photo", high speed = "off", NCA (no color adjustment)

Media Setting Epson Ultra Premium Photo Paper Luster

Profile: EP1400_MISD2_RRUltraProSat2.icm **Rendering** Perceptual
Profile type: custom, provided by AaI&A for this test.

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

Optical Brighteners Present? <i>yes (low)</i>	L*		a*		b*	
Media Whitepoint Color	UV inc	UV exc	UV inc	UV exc	UV inc	UV exc
	94.3	94.4	0.1	-0.4	-4.3	-2.2
	UV-inc/UV-exc ΔL^*, Δa^*, Δb^* respectively					
	0.1		0.5		2.1	
	<i>Calculated differences, especially for Δb^*, indicate the role and magnitude of fluorescence on original paper color</i>					
Maximum Printed Black	L*	a*	b*	Optical Density (Dmax)		
	6.3	-1.5	-3.9	2.15		

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: 10916 Lux
Average Temperature: 23.9°C over full test duration, 25.5°C during light exposure.
Average Relative humidity: 53.7%RH over full test duration, 54.0%RH during light exposure.

Notes/Comments:**Replicates/Compare to:**

Compare to these other Red River Ultra Pro Satin 2.0 paper samples tested as part of a direct side-by-side light fade test for this paper:

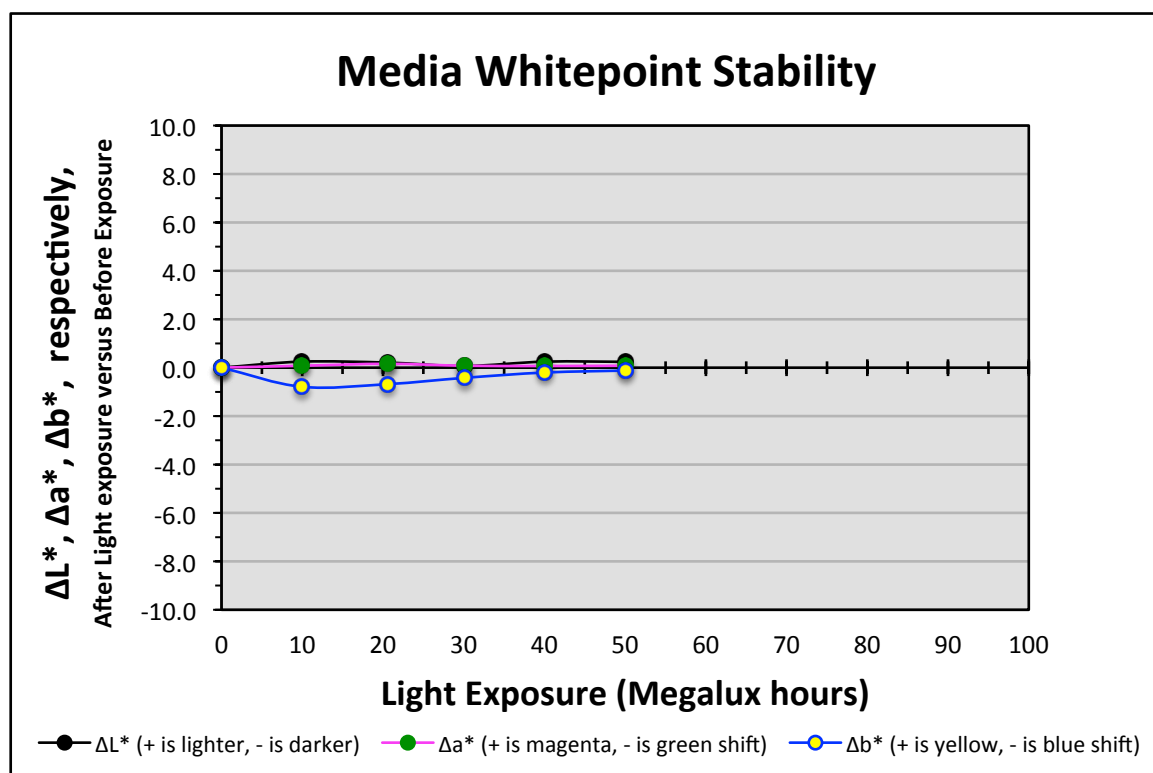
ID# 273 – sample # AaI_20121030_SN001 – printed on the same Epson 1400 printer and batch of paper but uses Epson OEM Claria 79 ink set.

ID# 276 – sample # AaI_20121116_SN001 – printed on an Epson Stylus Pro 7880 using Epson OEM UltraChrome K3™ with Vivid Magenta pigmented ink set.

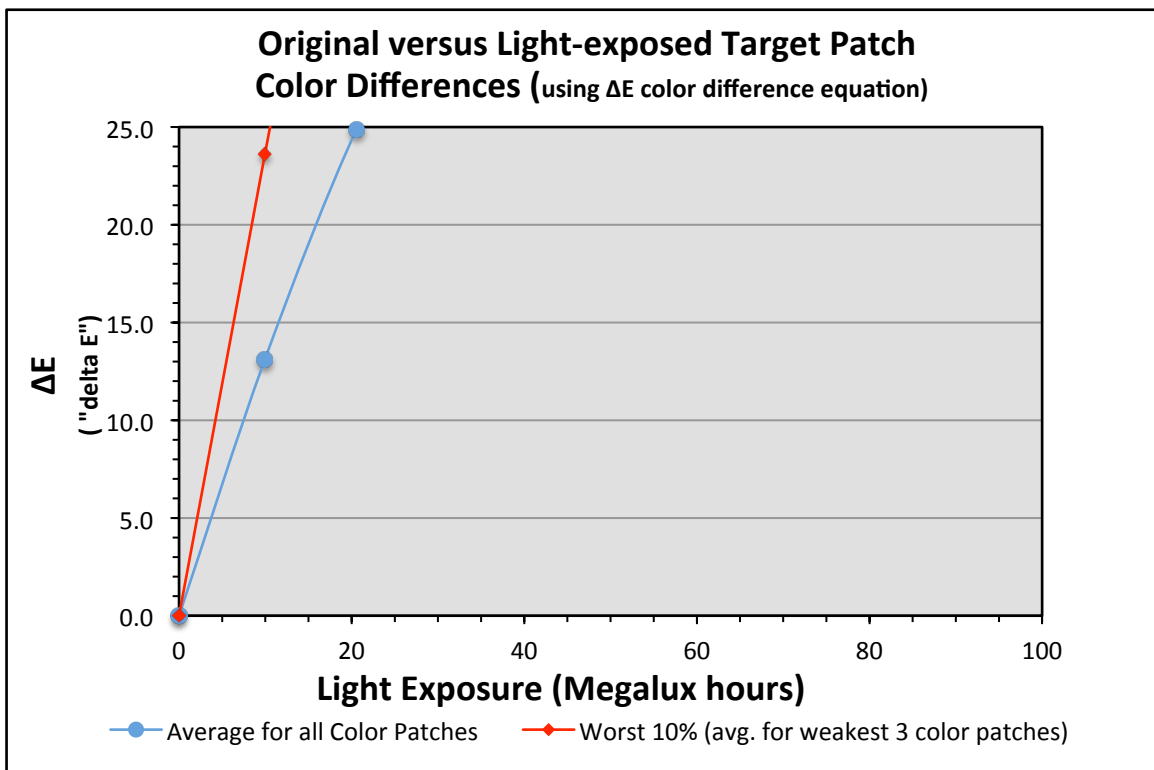
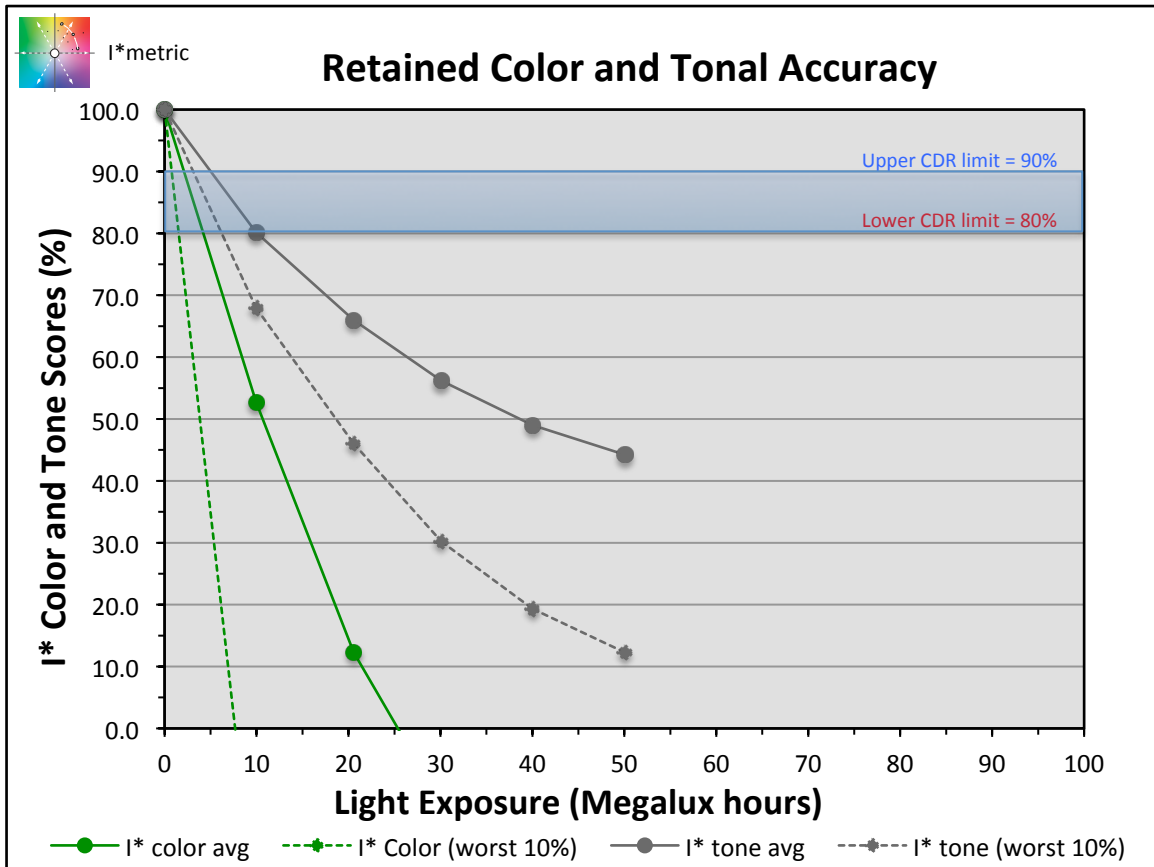
ID# 277 – sample # AaI_20121130_SN002 – printed on an Epson R3000 using ConeColorPro® pigmented Ink set (for the Epson R3000 printer).

Graphs:

Epson Stylus Photo 1400, MIS Associates D2 Dyebase Ink set for Epson Claria Printers, Red River Ultra Pro Satin 2.0 (68lb - 270gsm - 10.4 mil), no additional coating

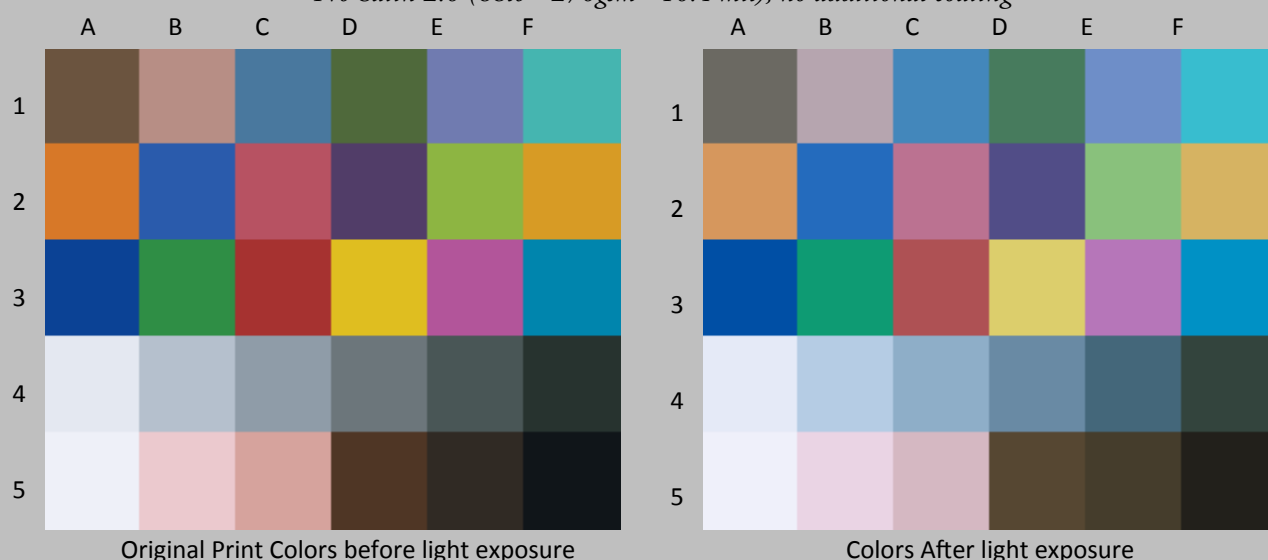


Epson Stylus Photo 1400, MIS Associates D2 Dyebase Ink set for Epson Claria Printers, Red River Ultra Pro Satin 2.0 (68lb - 270gsm - 10.4 mil), no additional coating



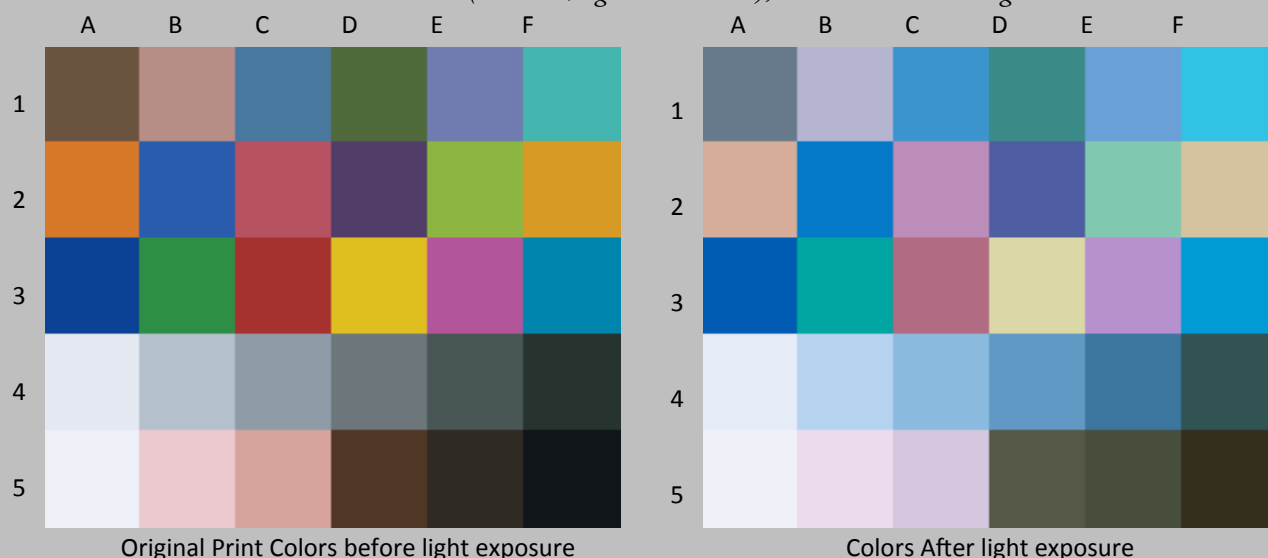
Values:

Epson Stylus Photo 1400, MIS Associates D2 Dyebase Ink set for Epson Claria Printers, Red River Ultra Pro Satin 2.0 (68lb - 270gsm - 10.4 mil), no additional coating



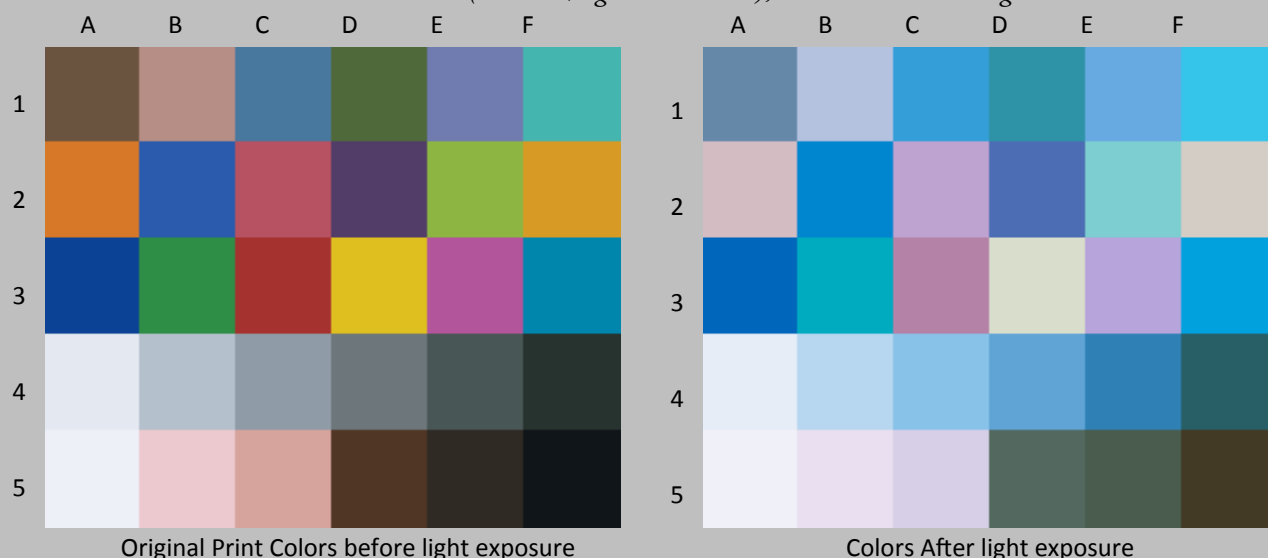
Patch #	Description	I* Color	ΔE	L*		a*		b*	
				Before	After	Before	After	Before	After
A1	Dark Skin	22.0	15.9	37.5	44.2	7.6	0.3	16.2	3.7
B1	Light Skin	18.4	17.2	62.6	69.4	15.0	7.7	11.1	-2.8
C1	Blue sky	72.3	9.8	48.1	53.7	-7.7	-10.4	-26.4	-34.0
D1	Foliage	54.4	14.8	41.8	47.4	-17.4	-23.7	23.2	11.0
E1	blue flower	77.3	9.7	52.3	58.6	5.8	-0.4	-29.7	-33.7
F1	bluish green	63.7	13.5	67.4	70.3	-34.3	-31.7	-6.7	-19.6
A1	orange	68.9	22.3	60.3	67.8	33.5	20.2	56.7	40.5
B2	purplish blue	89.4	7.7	39.0	44.2	6.3	0.7	-48.7	-49.8
C2	moderate red	58.9	20.4	48.8	56.8	42.7	32.8	12.1	-3.8
D2	purple	64.3	11.7	29.5	35.3	16.0	13.3	-21.9	-31.8
E2	yellow green	61.4	23.4	69.0	72.8	-26.8	-29.5	51.9	29.0
F2	orange yellow	68.2	22.7	68.7	74.8	16.4	6.4	65.2	45.7
A3	blue	92.6	6.2	29.2	33.7	10.4	6.8	-51.0	-53.5
B3	green	64.4	18.9	52.4	56.8	-40.6	-43.1	29.6	11.3
C3	red	73.4	17.2	39.6	46.7	48.1	39.1	30.0	17.2
D3	yellow	67.6	24.8	78.2	82.5	2.3	-3.5	73.8	50.1
E3	magenta	76.4	14.9	49.8	58.4	45.3	33.8	-20.5	-24.8
F3	cyan	82.7	8.5	50.4	54.8	-24.0	-24.4	-30.6	-37.8
A4	white	84.4	2.2	91.7	92.6	0.3	-0.1	-4.8	-6.8
B4	neutral 8	32.7	7.8	77.3	81.0	-1.9	-4.2	-8.3	-14.8
C4	neutral 6.5	(0.9)	11.6	63.7	69.3	-3.4	-7.4	-8.1	-17.4
D4	neutral 5	(47.3)	15.9	49.1	55.6	-3.4	-7.4	-4.0	-17.9
E4	neutral 3.5	(41.2)	15.2	35.5	41.5	-5.1	-8.7	-2.0	-15.4
F4	black	78.1	7.4	20.1	27.0	-5.6	-8.0	1.3	2.5
A5	paper white	96.9	0.8	94.8	95.0	0.4	0.5	-3.8	-4.6
B5	Skin highlight L*=88	42.3	8.6	83.8	87.0	12.6	9.6	2.2	-5.1
C5	Skin highlight L* =75	39.9	14.7	71.7	77.7	18.7	12.1	10.7	-1.0
D5	Skin shadow L*=28	67.9	8.8	25.3	31.4	10.3	3.9	15.0	15.4
E5	Skin shadow L*=13	32.6	11.1	17.6	26.2	1.5	1.3	4.8	11.7
F5	Maximum Black	20.1	10.2	6.3	12.4	-1.5	-0.2	-3.9	4.1
Summary Results		I* Color	I* tone	ΔE	10 Megalux hours				
Average Score for all patches		52.7	80.1	13.1					
Worst 10% (3 lowest scoring patches)		(29.8)	67.9	23.6					

Epson Stylus Photo 1400, MIS Associates D2 Dyebase Ink set for Epson Claria Printers, Red River Ultra Pro Satin 2.0 (68lb - 270gsm - 10.4 mil), no additional coating



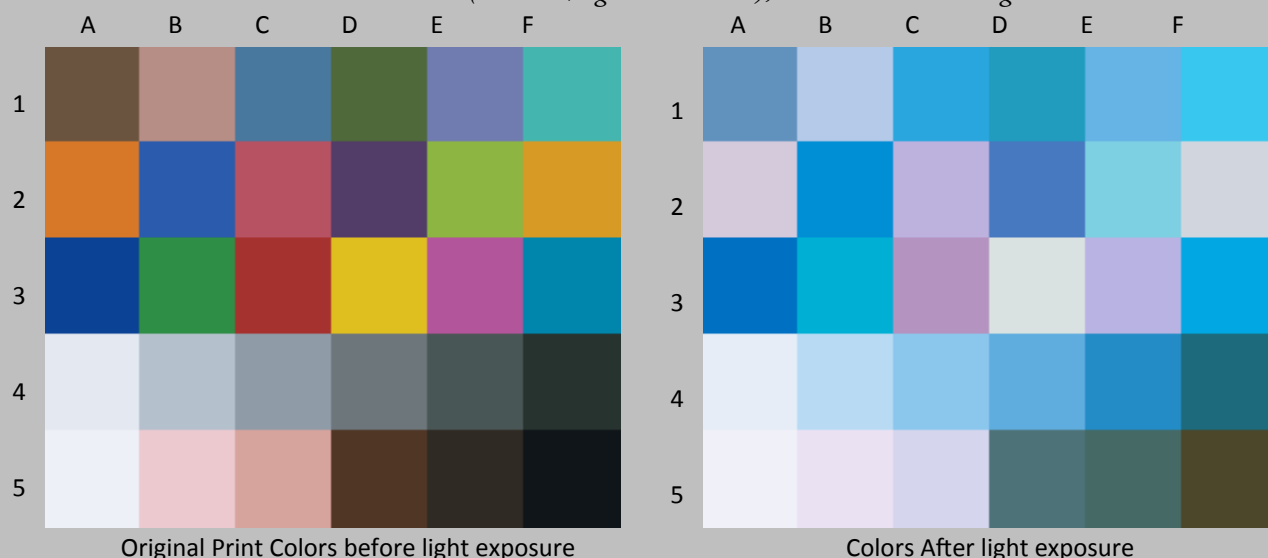
Patch #	Description	I* Color	ΔE	L*		a*		b*	
				Before	After	Before	After	Before	After
A1	Dark Skin	(66.7)	32.8	37.5	50.1	7.6	-3.8	16.2	-11.9
B1	Light Skin	(43.1)	29.7	62.6	74.6	15.0	3.6	11.1	-13.6
C1	Blue sky	53.7	16.6	48.1	58.1	-7.7	-13.3	-26.4	-38.3
D1	Foliage	(4.2)	32.5	41.8	52.5	-17.4	-25.8	23.2	-6.4
E1	blue flower	58.7	17.1	52.3	63.5	5.8	-6.0	-29.7	-35.2
F1	bluish green	39.9	22.0	67.4	72.3	-34.3	-29.5	-6.7	-27.7
A1	orange	32.5	47.1	60.3	74.1	33.5	12.5	56.7	16.9
B2	purplish blue	76.7	15.4	39.0	48.8	6.3	-5.6	-48.7	-49.4
C2	moderate red	25.8	36.9	48.8	64.4	42.7	24.1	12.1	-15.7
D2	purple	33.7	21.9	29.5	41.2	16.0	9.4	-21.9	-39.2
E2	yellow green	20.1	47.7	69.0	75.7	-26.8	-27.5	51.9	4.8
F2	orange yellow	31.9	47.5	68.7	79.4	16.4	2.1	65.2	21.2
A3	blue	83.2	12.8	29.2	38.0	10.4	1.8	-51.0	-54.3
B3	green	23.1	39.9	52.4	60.4	-40.6	-40.4	29.6	-9.6
C3	red	39.3	37.7	39.6	53.9	48.1	31.0	30.0	-0.5
D3	yellow	33.4	50.2	78.2	85.5	2.3	-4.7	73.8	24.6
E3	magenta	55.0	27.8	49.8	65.7	45.3	23.1	-20.5	-26.0
F3	cyan	71.9	13.8	50.4	58.2	-24.0	-25.4	-30.6	-41.9
A4	white	83.4	2.5	91.7	93.0	0.3	-0.4	-4.8	-6.8
B4	neutral 8	8.4	10.9	77.3	83.1	-1.9	-5.8	-8.3	-16.6
C4	neutral 6.5	(68.2)	19.0	63.7	73.2	-3.4	-9.7	-8.1	-23.3
D4	neutral 5	(160.2)	27.8	49.1	60.8	-3.4	-9.6	-4.0	-28.4
E4	neutral 3.5	(178.7)	29.3	35.5	46.9	-5.1	-10.1	-2.0	-28.5
F4	black	14.2	15.0	20.1	32.4	-5.6	-13.0	1.3	-3.3
A5	paper white	97.9	0.7	94.8	95.0	0.4	0.6	-3.8	-4.5
B5	Skin highlight L*=88	19.1	12.0	83.8	88.9	12.6	7.6	2.2	-7.4
C5	Skin highlight L* =75	(0.2)	24.3	71.7	81.8	18.7	8.5	10.7	-8.9
D5	Skin shadow L*=28	19.4	19.2	25.3	37.0	10.3	-4.2	15.0	10.4
E5	Skin shadow L*=13	19.4	16.8	17.6	32.3	1.5	-4.7	4.8	10.0
F5	Maximum Black	(51.1)	19.6	6.3	19.0	-1.5	1.2	-3.9	10.8
Summary Results		I* Color	I* tone	ΔE	20 Megalux hours				
Average Score for all patches		12.3	66.0	24.9					
Worst 10% (3 lowest scoring patches)		(135.7)	46.0	48.4					

Epson Stylus Photo 1400, MIS Associates D2 Dyebase Ink set for Epson Claria Printers, Red River Ultra Pro Satin 2.0 (68lb - 270gsm - 10.4 mil), no additional coating



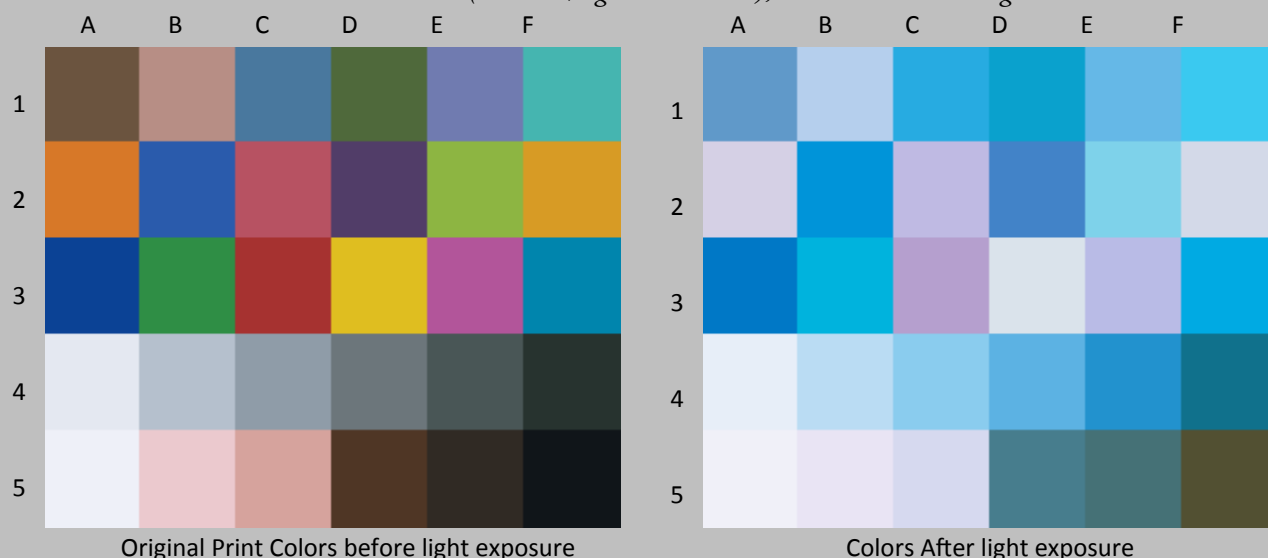
Patch #	Description	I* Color	ΔE	L*		a*		b*	
				Before	After	Before	After	Before	After
A1	Dark Skin	(123.0)	43.8	37.5	54.8	7.6	-6.3	16.2	-21.7
B1	Light Skin	(69.3)	35.6	62.6	78.1	15.0	0.3	11.1	-17.5
C1	Blue sky	44.9	20.4	48.1	61.2	-7.7	-16.3	-26.4	-39.4
D1	Foliage	(47.8)	45.7	41.8	56.2	-17.4	-25.2	23.2	-19.4
E1	blue flower	46.0	22.2	52.3	66.8	5.8	-10.3	-29.7	-34.7
F1	bluish green	32.3	24.9	67.4	73.5	-34.3	-29.0	-6.7	-30.3
A1	orange	8.4	63.6	60.3	78.8	33.5	9.2	56.7	1.0
B2	purplish blue	66.5	21.5	39.0	52.2	6.3	-10.7	-48.7	-48.3
C2	moderate red	8.9	46.2	48.8	70.1	42.7	17.2	12.1	-19.9
D2	purple	16.8	28.3	29.5	45.9	16.0	4.8	-21.9	-42.1
E2	yellow green	(4.6)	62.3	69.0	77.5	-26.8	-24.6	51.9	-9.7
F2	orange yellow	8.2	63.8	68.7	82.8	16.4	0.9	65.2	4.9
A3	blue	74.0	18.5	29.2	41.3	10.4	-3.3	-51.0	-54.0
B3	green	(3.2)	53.4	52.4	62.9	-40.6	-36.9	29.6	-22.7
C3	red	16.5	51.9	39.6	59.8	48.1	24.8	30.0	-11.7
D3	yellow	11.6	66.4	78.2	87.5	2.3	-3.8	73.8	8.3
E3	magenta	39.9	36.9	49.8	70.7	45.3	15.2	-20.5	-24.8
F3	cyan	68.4	16.2	50.4	60.3	-24.0	-27.1	-30.6	-43.0
A4	white	86.3	2.4	91.7	93.2	0.3	-0.6	-4.8	-6.4
B4	neutral 8	4.9	11.9	77.3	84.4	-1.9	-7.0	-8.3	-16.3
C4	neutral 6.5	(90.6)	22.1	63.7	75.6	-3.4	-11.7	-8.1	-24.7
D4	neutral 5	(203.5)	33.1	49.1	64.4	-3.4	-11.8	-4.0	-32.1
E4	neutral 3.5	(251.6)	37.3	35.5	51.0	-5.1	-11.7	-2.0	-35.3
F4	black	(59.1)	22.9	20.1	36.7	-5.6	-16.6	1.3	-9.8
A5	paper white	100.0	0.4	94.8	94.9	0.4	0.5	-3.8	-4.2
B5	Skin highlight L*=88	11.9	13.4	83.8	90.1	12.6	5.9	2.2	-7.5
C5	Skin highlight L* =75	(15.4)	28.3	71.7	84.2	18.7	5.7	10.7	-11.1
D5	Skin shadow L*=28	(26.8)	28.8	25.3	41.8	10.3	-9.9	15.0	2.8
E5	Skin shadow L*=13	(14.5)	22.6	17.6	37.1	1.5	-9.8	4.8	5.7
F5	Maximum Black	(99.5)	26.8	6.3	24.8	-1.5	0.6	-3.9	15.5
Summary Results		I* Color	I* tone	ΔE	30 Megalux hours				
Average Score for all patches		(12.1)	56.2	32.4					
Worst 10% (3 lowest scoring patches)		(192.7)	30.2	64.6					

Epson Stylus Photo 1400, MIS Associates D2 Dyebase Ink set for Epson Claria Printers, Red River Ultra Pro Satin 2.0 (68lb - 270gsm - 10.4 mil), no additional coating



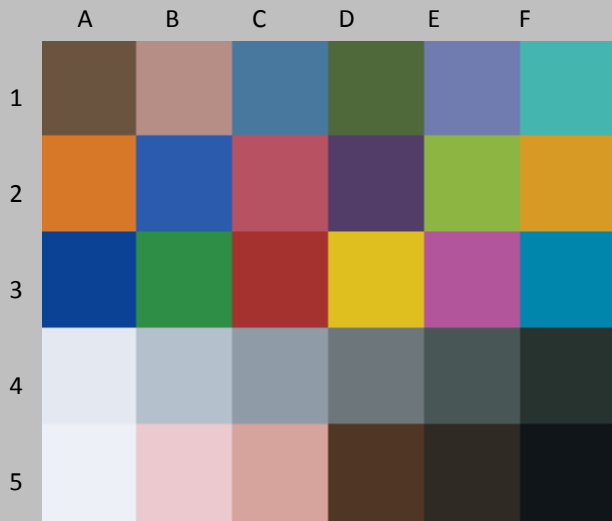
Patch #	Description	I* Color	ΔE	L*		a*		b*	
				Before	After	Before	After	Before	After
A1	Dark Skin	(160.0)	51.4	37.5	58.6	7.6	-8.2	16.2	-28.0
B1	Light Skin	(80.0)	38.5	62.6	80.5	15.0	-2.3	11.1	-18.3
C1	Blue sky	39.7	23.1	48.1	63.7	-7.7	-19.2	-26.4	-39.0
D1	Foliage	(77.6)	54.8	41.8	59.3	-17.4	-24.4	23.2	-28.3
E1	blue flower	35.8	26.2	52.3	69.4	5.8	-13.8	-29.7	-33.4
F1	bluish green	31.2	25.5	67.4	74.5	-34.3	-29.2	-6.7	-30.7
A1	orange	(5.2)	73.1	60.3	82.3	33.5	6.9	56.7	-7.8
B2	purplish blue	56.8	27.0	39.0	55.1	6.3	-15.3	-48.7	-46.7
C2	moderate red	(1.0)	52.1	48.8	74.3	42.7	11.4	12.1	-20.8
D2	purple	3.8	33.6	29.5	50.0	16.0	-0.3	-21.9	-43.0
E2	yellow green	(18.0)	70.2	69.0	79.0	-26.8	-22.6	51.9	-17.4
F2	orange yellow	(6.0)	73.6	68.7	85.2	16.4	0.5	65.2	-4.7
A3	blue	64.6	24.3	29.2	44.4	10.4	-8.4	-51.0	-52.9
B3	green	(19.5)	61.8	52.4	65.0	-40.6	-34.5	29.6	-30.7
C3	red	1.3	61.9	39.6	65.1	48.1	19.3	30.0	-18.6
D3	yellow	(1.5)	76.2	78.2	89.1	2.3	-2.8	73.8	-1.5
E3	magenta	28.2	43.8	49.8	74.6	45.3	9.2	-20.5	-23.2
F3	cyan	67.6	17.6	50.4	62.2	-24.0	-29.2	-30.6	-42.6
A4	white	88.0	2.5	91.7	93.5	0.3	-0.8	-4.8	-6.0
B4	neutral 8	4.4	12.6	77.3	85.5	-1.9	-8.0	-8.3	-15.7
C4	neutral 6.5	(98.7)	23.7	63.7	77.4	-3.4	-13.5	-8.1	-24.6
D4	neutral 5	(222.7)	36.0	49.1	67.1	-3.4	-14.3	-4.0	-33.2
E4	neutral 3.5	(293.5)	42.4	35.5	54.5	-5.1	-13.5	-2.0	-38.9
F4	black	(129.8)	30.4	20.1	40.6	-5.6	-18.8	1.3	-16.7
A5	paper white	100.0	0.3	94.8	95.0	0.4	0.5	-3.8	-4.0
B5	Skin highlight L*=88	7.4	14.4	83.8	91.0	12.6	4.6	2.2	-7.2
C5	Skin highlight L* =75	(22.6)	30.5	71.7	86.0	18.7	3.6	10.7	-11.6
D5	Skin shadow L*=28	(74.6)	38.3	25.3	46.0	10.3	-13.4	15.0	-6.9
E5	Skin shadow L*=13	(69.3)	29.1	17.6	41.4	1.5	-13.8	4.8	-1.6
F5	Maximum Black	(126.8)	32.3	6.3	29.9	-1.5	-0.9	-3.9	18.2
Summary Results		I* Color	I* tone	ΔE	40 Megalux hours				
Average Score for all patches		(29.3)	49.0	37.6					
Worst 10% (3 lowest scoring patches)		(225.4)	19.3	74.3					

Epson Stylus Photo 1400, MIS Associates D2 Dyebase Ink set for Epson Claria Printers, Red River Ultra Pro Satin 2.0 (68lb - 270gsm - 10.4 mil), no additional coating



Patch #	Description	I* Color	ΔE	L*		a*		b*	
				Before	After	Before	After	Before	After
A1	Dark Skin	(178.4)	55.4	37.5	61.0	7.6	-9.3	16.2	-31.1
B1	Light Skin	(83.2)	39.7	62.6	81.8	15.0	-3.8	11.1	-18.1
C1	Blue sky	36.9	24.6	48.1	65.2	-7.7	-20.9	-26.4	-38.3
D1	Foliage	(92.5)	59.6	41.8	61.3	-17.4	-23.9	23.2	-32.7
E1	blue flower	29.9	28.6	52.3	70.9	5.8	-15.8	-29.7	-32.4
F1	bluish green	31.7	25.5	67.4	75.0	-34.3	-29.2	-6.7	-30.5
A1	orange	(9.9)	76.7	60.3	84.3	33.5	5.2	56.7	-10.5
B2	purplish blue	50.6	30.6	39.0	56.9	6.3	-18.3	-48.7	-45.6
C2	moderate red	(6.2)	55.4	48.8	76.9	42.7	7.7	12.1	-20.2
D2	purple	(4.1)	37.1	29.5	52.9	16.0	-3.9	-21.9	-42.7
E2	yellow green	(22.8)	73.1	69.0	79.8	-26.8	-21.7	51.9	-20.2
F2	orange yellow	(11.2)	77.3	68.7	86.7	16.4	-0.1	65.2	-8.2
A3	blue	58.0	28.3	29.2	46.6	10.4	-11.9	-51.0	-52.0
B3	green	(26.5)	65.5	52.4	66.2	-40.6	-33.4	29.6	-34.1
C3	red	(6.4)	67.4	39.6	68.7	48.1	15.2	30.0	-21.1
D3	yellow	(6.2)	79.8	78.2	89.9	2.3	-2.5	73.8	-5.0
E3	magenta	21.1	48.1	49.8	77.0	45.3	5.6	-20.5	-21.7
F3	cyan	67.3	18.4	50.4	63.3	-24.0	-30.5	-30.6	-42.1
A4	white	89.1	2.5	91.7	93.6	0.3	-0.9	-4.8	-5.8
B4	neutral 8	5.7	12.9	77.3	86.1	-1.9	-8.4	-8.3	-15.1
C4	neutral 6.5	(99.6)	24.5	63.7	78.5	-3.4	-14.5	-8.1	-24.1
D4	neutral 5	(228.1)	37.3	49.1	68.8	-3.4	-16.1	-4.0	-33.0
E4	neutral 3.5	(311.0)	44.9	35.5	56.8	-5.1	-15.2	-2.0	-40.2
F4	black	(185.3)	36.3	20.1	43.6	-5.6	-19.5	1.3	-22.6
A5	paper white	100.0	0.3	94.8	95.0	0.4	0.5	-3.8	-3.9
B5	Skin highlight L*=88	4.7	14.9	83.8	91.5	12.6	3.8	2.2	-6.9
C5	Skin highlight L* =75	(25.4)	31.6	71.7	87.1	18.7	2.3	10.7	-11.4
D5	Skin shadow L*=28	(112.1)	45.8	25.3	49.2	10.3	-14.6	15.0	-15.2
E5	Skin shadow L*=13	(118.7)	34.5	17.6	44.7	1.5	-15.5	4.8	-8.0
F5	Maximum Black	(125.9)	35.1	6.3	33.6	-1.5	-2.7	-3.9	18.1
Summary Results		I* Color	I* tone	ΔE	50 Megalux hours				
Average Score for all patches		(38.6)	44.2	40.4					
Worst 10% (3 lowest scoring patches)		(241.5)	12.3	77.9					

Test is Complete (no more updates)



Original Print Colors before light exposure



Colors After light exposure

Patch #	Description	I* Color	ΔE	L*		a*		b*	
				Before	After	Before	After	Before	After
A1	Dark Skin			37.5		7.6		16.2	
B1	Light Skin			62.6		15.0		11.1	
C1	Blue sky			48.1		-7.7		-26.4	
D1	Foliage			41.8		-17.4		23.2	
E1	blue flower			52.3		5.8		-29.7	
F1	bluish green			67.4		-34.3		-6.7	
A1	orange			60.3		33.5		56.7	
B2	purplish blue			39.0		6.3		-48.7	
C2	moderate red			48.8		42.7		12.1	
D2	purple			29.5		16.0		-21.9	
E2	yellow green			69.0		-26.8		51.9	
F2	orange yellow			68.7		16.4		65.2	
A3	blue			29.2		10.4		-51.0	
B3	green			52.4		-40.6		29.6	
C3	red			39.6		48.1		30.0	
D3	yellow			78.2		2.3		73.8	
E3	magenta			49.8		45.3		-20.5	
F3	cyan			50.4		-24.0		-30.6	
A4	white			91.7		0.3		-4.8	
B4	neutral 8			77.3		-1.9		-8.3	
C4	neutral 6.5			63.7		-3.4		-8.1	
D4	neutral 5			49.1		-3.4		-4.0	
E4	neutral 3.5			35.5		-5.1		-2.0	
F4	black			20.1		-5.6		1.3	
A5	paper white			94.8		0.4		-3.8	
B5	Skin highlight L*=88			83.8		12.6		2.2	
C5	Skin highlight L* =75			71.7		18.7		10.7	
D5	Skin shadow L*=28			25.3		10.3		15.0	
E5	Skin shadow L*=13			17.6		1.5		4.8	
F5	Maximum Black			6.3		-1.5		-3.9	
Summary Results		I* Color	I* tone	ΔE	Test Completed				
Average Score for all patches									
Worst 10% (3 lowest scoring patches)									