

Accelerated Light Fading Test Results

Epson Stylus Pro 9600, Cone Piezotone (custom blend, Portfolio Black, K underprint), Hahnemühle William Turner 310gsm

Sample # AaI_20090725_SN001 180 Megalux-hours completed

Conservation Display Rating *								
Lower Exposure Limit (Megalux hours)	Upper Exposure limit (Megalux hours)							
passing	passing							

* 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 an explanation of the conservation display ratings.

Document #: AaI_20090725_SN001Lf.pdf Rev: April 4, 2013 Test Print Prepared by: AaI&A Member

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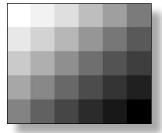


Aardenburg Imaging & Archives

About this Report

This report contains light fastness information about a single 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 2). 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 the Test Results



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 printing the digital image shown on the left. This image is designed specifically for monochrome printing applications. It contains 30 neutral colors ranging from maximum white (L*= 100, a*= 0, b*= 0) to maximum black (L* = 0, a*= 0, b*= 0). Any hue and chroma observed in the "Original Print Colors" were achieved by the printmaker's selection of media, RIP/driver settings, and choice of inks installed in the printer. The actual sample appearance reproduced in this report is digitally mastered from the colorimetric measurements of the test sample.

AaI_StandardB&Wset(v2).tif

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 presentation of the target images simulates looking at the light-exposed print along side a perfect duplicate of the unexposed original print. The "Before/After" Layer mode takes advantage of Adobe Reader Layer technology. Toggle the "Before/After" layer on and off using the layers feature of Adobe Reader to directly switch between the light exposed print colors and the initial print colors for the image located on the right side of each page. 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 Aal&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. It was a major reason behind the development of the I* metric.

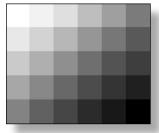


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Sample Description

Printer: Epson Stylus Pro 9600Ink: Cone Piezotone (custom blend, Portfolio Black, K underprint)**Paper: Hahnemühle William Turner 310 gsm paper

Sample #: AaI_20000725_SN001 Test Print Prepared by: AaI&A member



Test Image: AaI_StandardB&Wset(v2).tif **RIP/Driver settings:** ErgoSoft StudioPrint (ver. 12), RIP and file preparation standardized and linearized to gray 20% dot gain working space, so no color correction **Media Setting:** custom ink/paper setup in RIP (see above, RIP/driver settings)

Printed: July 25, 2009 **Original print colors measured on:** August 10, 2009 **Test started on:** August 12, 2009

Rendering Intent: n.a.

AaI_StandardB&Wset(v2).tif

Profile: 20% dot gain gray **Profile type:** generic **Profile Creation Software:** n.a.

	Paper White Color (UV–included versus UV–excluded) and Maximum Printed Black									
	Optical Brighteners present?	L	*	a	*	b	*			
	no	UV inc	UV exc	UV inc	UV exc	UV inc	UV exc			
	Maximum Paper White (no colorants printed)	96.6	96.6	0.3	0.3	1.9	1.9			
	(1) ΔL^* , Δa^* , Δb^* respectively	0.0 0.0 0.0					0			
(1) Calculated differences, especially for Δb^* , indicate the role and magnitude of fluorescence on original paper color										
	Maximum Printed black (UV included)	L* =	15.7	a* =	0.8	b* = 1.1				

Light Source: Phillips Colortone F40T12/C50

Filter/Glazing: Sample framed under Glass*

Light Exposure Cycle: 8 hours on, 4 hours off, twice per 24 hours

Average Illuminance during "on" cycle: 11,182 Lux

Average Temperature: 23.8°C over full test duration, 25.5°C during light exposure

Average Relative humidity: 58.5%RH full test period, 58.4%RH during light exposure

CIELAB measurements: D50 2 observer, Xrite Gretag/Macbeth Spectrolino/Spectroscan

Replicates/Compare to:

No Replicates are available at this time.

Notes/Comments:

* The Phillips Colortone F40T12/C50 fluorescent light source and ordinary glass picture frame glazing yields UVA content and overall spectral power similar to natural 5000°K daylight entering a window and then striking a print that has been framed by **standard acrylic glazing** rather than ordinary glass. Other light sources and/or different glazing options may yield greater or lesser fade rates (generally, a 2-5x increase in fade rate for direct sunlight compared to UV–excluded sources at the same Lux level). The spectral quality of the light can also affect individual colors differently.

** Cone Piezotone, Custom blend, K underprint – The following comments about this test sample provided by our submitting AaI&A member:

"Cone Piezotone Quad: Highlight ink is Warm Neutral with some Sepia hand mixed in, combined in the RIP with Selenium highlight ink. They are simply both used, no proportioning.

Middle gray ink is the Warm Neutral.

Shadow ink is the Selenium.

The black is Piezotone Portfolio Black, however, it is "underprinted" with the dark gray ink from the unused set by selecting 2 inks for the RIP black quadrant rather than one (normal). They are used equally, it is not possible to proportion them in the sofware done this way. In this setup the unused Warm/Sepia hand mixed dark gray is selected with the Portfolio Black.

Since this setup is one I personally use on William Turner I decided to send it with the others even though it will provide no additional info with regard to an underprinted Portfolio K [See, samples AaI_20090725_SN003 and SN005]. The other two cover that well, but I don't find them as pretty as this for the print I wanted to donate...well you get the idea [an exquisite print was donated to Aardenburg Archives which was a compelling reason to test this very unique ink combination. The Archives will now have process-specific light fastness information on this artist's donated work].

Regarding the software and color management questions.... With a RIP one does not print out of Photoshop or any application, the tiff is imported into the RIP and printed directly, you probably know this anyway [yes, AaI&A tries to provide a generic form for documentation and let the members document to the best of their ability. Not all questions apply to all setups]. The StudioPrint Monochromatic ink setups include no color managed path, but they are carefully linearized, to a user selectable standard. In my case I use 20% dot gain. Then it prints as a good match to files prepped in a 20% dot gain grayscale space in Photoshop (the pre-press standard anyway), but it does not matter if the files are tagged, as the StudioPrint does not see the profile in a monochromatic setep. Hence, the rendering intent question becomes N/A."

[thanks to our submitting member for this detailed explanation].

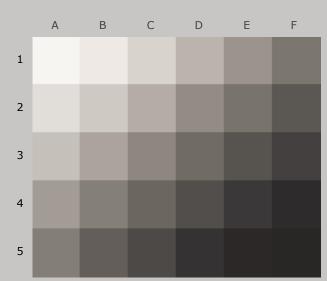
Table	Table to Convert Megalux-hours of Light Exposure to estimated "Years on Display"											
Indoor Light Lev	vels for Print Display	Multiply Mlux-hrs		Megalux-hours in test								
Light Exposure	Light Exposure Description		10	20	30	40	50	60	70	80	90	100
≤ 10 Lux 24 hours per day	Interior rooms, storage areas, or hallways without win- dows, 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 LuxAverage home illumination12 hours per daylevel for photos is ~ 60 lux.90% of all displayed photosdo 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 commer- cial office building illumina- tion 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 stan- dards 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 win- dow 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

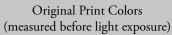
Light levels commonly encountered in the real world fluctuate widely throughout indoor print display environments and produce large variations in how long it takes for artwork to acquire light-induced damage. Use this table as a guide to estimate how many "years on display" (denoted in red text) it takes to accumulate 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!

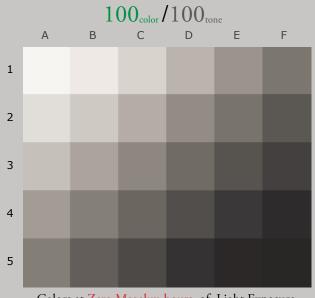
Note that as the years of display time increase, light-induced fading can be eclipsed by other serious aging mechanisms such as fading and/or staining caused by heat, humidity, and air pollutants. Mould damage can also occur at high humidity. Even when colorants remain water fast, direct contact with 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 has cited this exposure condition and 90% confidence limit as a rationale for estimating print fading times of traditional color photo materials in typical home display environments. For recent light fading claims regarding its line of pigment-based inkjet printers, Kodak has 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) has standardized its light fastness ratings on 450 lux for 12 hours per day in order to estimate the years on display necessary to reach "noticeable" fading. This average light exposure condition, an assumed 75°F/60%RH temperature and humidity level, and WIR's visually weighted densitometric endpoint criteria set V3.0 has become a de facto industry standard for most predictive light fading estimates in the absence of a published International Standards Organization (ISO) test standard.



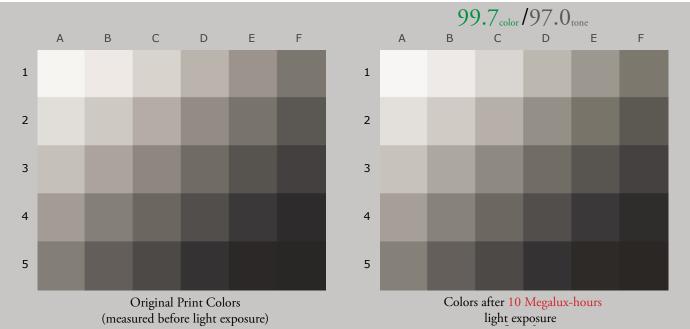




Colors at Zero Megalux-hours of Light Exposure (same as original print colors)

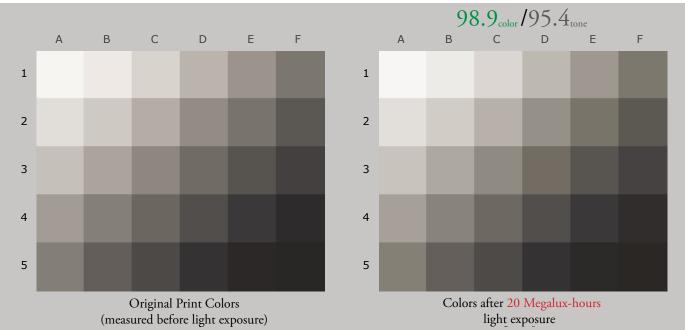
Epson Stylus Pro 9600, Cone Piezotone (custom blend, Portfolio Black, K underprint), Hahnemühle William Turner 310gsm

	Origiı	nal Print	Colors a	s Measur	ed and a	t Start of	Test		Original Print Colors as Measured and at Start of Test											
				L	*	a		b	*											
Column/row	Color Patch	I*Color	ΔE	Before	After	Before	After	Before	After											
A1	Media White	100	0.0	96.6		0.4		1.9												
B1	Highlight L* = 96	100	0.0	92.4		0.7		2.6												
C1	Highlight L* = 89	100	0.0	84.8		1.0		3.6												
D1	Highlight L* = 78	100	0.0	73.9		1.5		4.6												
E1	Midtone L* = 66	100	0.0	61.6		1.6		4.6												
F1	Midtone $L^* = 52$	100	0.0	50.0		1.2		5.5												
A2	Highlight L* = 92	100	0.0	88.3		0.9		3.3												
B2	Highlight L* = 85	100	0.0	81.0		1.2		4.1												
C2	Highlight L* = 75	100	0.0	71.1		1.5		4.7												
D2	Midtone $L^* = 63$	100	0.0	58.5		1.6		4.3												
E2	Midtone $L^* = 50$	100	0.0	48.6		1.2		5.4												
F2	Midtone L* = 38	100	0.0	37.4		0.9		3.4												
A3	Highlight L* = 82	100	0.0	77.9		1.4		4.3												
B3	Midtone $L^* = 72$	100	0.0	67.9		1.6		4.8												
C3	Midtone $L^* = 60$	100	0.0	56.3		1.5		4.3												
D3	Midtone L* = 47	100	0.0	45.5		1.1		5.4												
E3	Midtone $L^* = 35$	100	0.0	35.8		0.8		2.9												
F3	Shadow $L^* = 25$	100	0.0	27.6		0.8		0.6												
A4	Midtone L* = 69	100	0.0	64.7		1.6		4.7												
B4	Midtone L* = 57	100	0.0	53.5		1.4		4.5												
C4	Midtone $L^* = 45$	100	0.0	43.6		1.1		5.2												
D4	Midtone $L^* = 32$	100	0.0	33.3		0.8		2.2												
E4	Shadow $L^* = 20$	100	0.0	23.7		0.8		0.2												
F4	Shadow $L^* = 10$	100	0.0	17.7		0.7		0.4												
A5	Midtone $L^* = 55$	100	0.0	52.9		1.4		5.3												
B5	Midtone L* = 41	100	0.0	40.4		1.0		4.3												
C5	Shadow $L^* = 29$	100	0.0	31.4		0.7		1.6												
D5	Shadow $L^* = 15$	100	0.0	21.2		0.7		0.0												
E5	Shadow $L^* = 5$	100	0.0	16.6		0.7		0.6												
<u>F5</u>	Max Black	100	0.0	15.7		0.8		1.1												
	nary Results	I*Color		ΔΕ																
	,	100	100	0.0		AA	RDENBURG	Imaging												
	Average Score for all patches		100	0.0		· · · · · · · · · · · · · · · · · · ·	& Archi													
	Average Score for the Worst 10% (3 lowest scoring patches)		100	0.0		X	& ARCHI	VES	Page 5											



Epson Stylus Pro 9600,	Cone Piezotone (custom blend, Portfolio Black,
K underprint),	Hahnemühle William Turner 310gsm

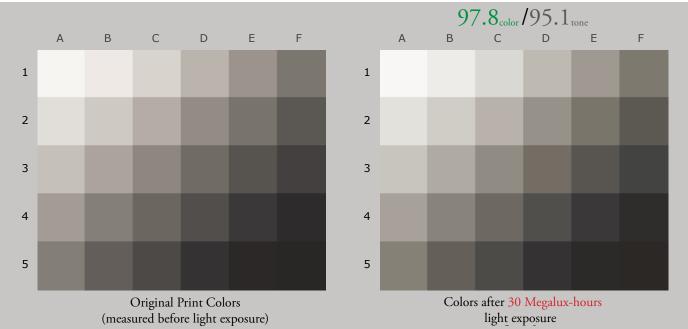
10	10 Mlux-hrs Light Exposure (i.e., after) Compared to Original Print Colors (i.e., before)											
				L	*	a	*	b	*			
Column/row	Color Patch	I*Color	ΔE	Before	After	Before	After	Before	After			
A1	Media White	97.9	0.8	96.6	96.9	0.4	0.4	1.9	1.2			
B1	Highlight L* = 96	99.5	0.8	92.4	92.9	0.7	0.5	2.6	2.0			
C1	Highlight L* = 89	100.0	0.9	84.8	85.6	1.0	0.8	3.6	3.3			
D1	Highlight L* = 78	100.0	1.1	73.9	74.9	1.5	1.1	4.6	4.6			
E1	Midtone L* = 66	100.0	1.1	61.6	62.6	1.6	1.3	4.6	4.8			
F1	Midtone $L^* = 52$	100.0	0.6	50.0	50.5	1.2	1.2	5.5	5.5			
A2	Highlight L* = 92	100.0	0.9	88.3	89.0	0.9	0.7	3.3	2.8			
B2	Highlight L* = 85	100.0	1.0	81.0	81.9	1.2	0.9	4.1	3.9			
C2	Highlight L* = 75	100.0	1.0	71.1	72.1	1.5	1.2	4.7	4.7			
D2	Midtone $L^* = 63$	100.0	1.1	58.5	59.5	1.6	1.3	4.3	4.6			
E2	Midtone $L^* = 50$	100.0	0.4	48.6	49.0	1.2	1.1	5.4	5.5			
F2	Midtone L* = 38	100.0	0.2	37.4	37.6	0.9	0.9	3.4	3.6			
A3	Highlight L* = 82	100.0	1.1	77.9	78.8	1.4	1.0	4.3	4.2			
B3	Midtone $L^* = 72$	100.0	1.1	67.9	68.9	1.6	1.2	4.8	4.9			
C3	Midtone $L^* = 60$	100.0	1.1	56.3	57.4	1.5	1.3	4.3	4.7			
D3	Midtone L* = 47	100.0	0.3	45.5	45.9	1.1	1.1	5.4	5.5			
E3	Midtone $L^* = 35$	100.0	0.2	35.8	35.9	0.8	0.8	2.9	3.0			
F3	Shadow $L^* = 25$	100.0	0.3	27.6	27.9	0.8	0.8	0.6	0.7			
A4	Midtone L* = 69	100.0	1.2	64.7	65.8	1.6	1.3	4.7	4.9			
B4	Midtone L* = 57	100.0	0.9	53.5	54.3	1.4	1.2	4.5	4.8			
C4	Midtone L* = 45	100.0	0.3	43.6	43.9	1.1	1.0	5.2	5.3			
D4	Midtone $L^* = 32$	100.0	0.2	33.3	33.4	0.8	0.7	2.2	2.3			
E4	Shadow $L^* = 20$	100.0	0.1	23.7	23.8	0.8	0.8	0.2	0.2			
F4	Shadow $L^* = 10$	98.5	0.8	17.7	18.3	0.7	0.8	0.4	1.0			
A5	Midtone $L^* = 55$	100.0	0.8	52.9	53.6	1.4	1.2	5.3	5.4			
B5	Midtone L* = 41	100.0	0.2	40.4	40.6	1.0	0.9	4.3	4.4			
C5	Shadow $L^* = 29$	100.0	0.2	31.4	31.5	0.7	0.7	1.6	1.7			
D5	Shadow $L^* = 15$	100.0	0.2	21.2	21.2	0.7	0.8	0.0	0.2			
E5	Shadow $L^* = 5$	95.7	1.1	16.6	17.2	0.7	0.9	0.6	1.5			
F5	Max Black	98.0	0.9	15.7	16.2	0.8	1.0	1.1	1.7			
Sumr			I*tone	ΔE								
Average So	Average Score for all patches 99		97.0	0.7		Ал	RDENBURG					
	ore for the Worst 10% 97.2 95.0 1.2 & ARCHIVES			VES	Page 6							



Colors after 20 Megalux-hours light exposure

Epson Stylus Pro 9600,	Cone Piezotone	(custom blend,	Portfolio Black,
K underprint),	Hahnemühle W	Villiam Turner	310gsm

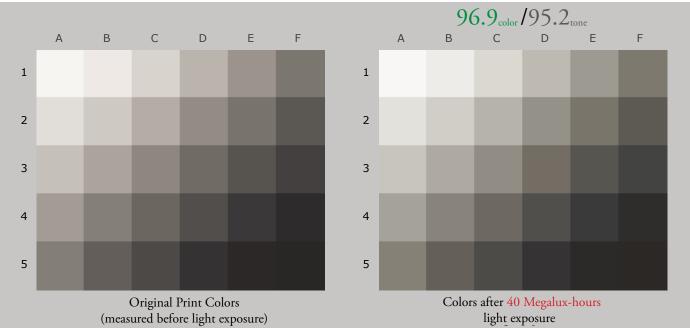
20	20 Mlux-hrs Light Exposure (i.e., after) Compared to Original Print Colors (i.e., before)											
				L	*	a	*	b	*			
Column/row	Color Patch	I*Color	ΔE	Before	After	Before	After	Before	After			
A1	Media White	98.5	0.8	96.6	97.0	0.4	0.4	1.9	1.2			
B1	Highlight L* = 96	99.9	0.8	92.4	93.0	0.7	0.4	2.6	2.1			
C1	Highlight L* = 89	99.8	1.2	84.8	85.9	1.0	0.5	3.6	3.4			
D1	Highlight L* = 78	97.7	1.6	73.9	75.3	1.5	0.8	4.6	4.8			
E1	Midtone L* = 66	96.6	1.7	61.6	63.1	1.6	0.9	4.6	5.0			
F1	Midtone $L^* = 52$	100.0	0.8	50.0	50.7	1.2	1.1	5.5	5.7			
A2	Highlight L* = 92	99.7	1.1	88.3	89.2	0.9	0.5	3.3	2.9			
B2	Highlight L* = 85	98.8	1.4	81.0	82.3	1.2	0.6	4.1	4.0			
C2	Highlight L* = 75	97.5	1.8	71.1	72.7	1.5	0.8	4.7	4.9			
D2	Midtone L* = 63	96.2	1.7	58.5	60.0	1.6	0.9	4.3	4.8			
E2	Midtone $L^* = 50$	100.0	0.6	48.6	49.2	1.2	1.0	5.4	5.6			
F2	Midtone L* = 38	100.0	0.3	37.4	37.6	0.9	0.8	3.4	3.6			
A3	Highlight L* = 82	98.4	1.5	77.9	79.2	1.4	0.7	4.3	4.4			
B3	Midtone L* = 72	97.0	1.7	67.9	69.4	1.6	0.9	4.8	5.0			
C3	Midtone $L^* = 60$	97.1	1.6	56.3	57.7	1.5	1.0	4.3	4.8			
D3	Midtone L* = 47	100.0	0.5	45.5	46.0	1.1	1.0	5.4	5.6			
E3	Midtone $L^* = 35$	100.0	0.4	35.8	36.1	0.8	0.7	2.9	3.1			
F3	Shadow $L^* = 25$	100.0	0.5	27.6	28.1	0.8	0.6	0.6	0.8			
A4	Midtone $L^* = 69$	96.9	1.9	64.7	66.4	1.6	0.9	4.7	5.1			
B4	Midtone L* = 57	98.6	1.3	53.5	54.7	1.4	1.0	4.5	5.0			
C4	Midtone $L^* = 45$	100.0	0.6	43.6	44.2	1.1	1.0	5.2	5.4			
D4	Midtone $L^* = 32$	100.0	0.3	33.3	33.4	0.8	0.6	2.2	2.3			
E4	Shadow $L^* = 20$	100.0	0.4	23.7	24.1	0.8	0.7	0.2	0.2			
F4	Shadow $L^* = 10$	99.0	1.1	17.7	18.7	0.7	0.7	0.4	1.0			
A5	Midtone $L^* = 55$	100.0	1.0	52.9	53.9	1.4	1.1	5.3	5.5			
B5	Midtone $L^* = 41$	100.0	0.3	40.4	40.7	1.0	0.9	4.3	4.5			
C5	Shadow $L^* = 29$	100.0	0.3	31.4	31.7	0.7	0.5	1.6	1.7			
D5	Shadow L* = 15	100.0	0.1	21.2	21.2	0.7	0.7	0.0	0.1			
E5	Shadow $L^* = 5$	96.7	1.0	16.6	17.2	0.7	0.8	0.6	1.4			
F5	Max Black	98.1	0.8	15.7	16.1	0.8	0.9	1.1	1.7			
Sumr	Summary Results I*		I*tone	ΔE								
Average So	core for all patches	98.9	95.4	1.0		Ал	RDENBURG					
	re for the Worst 10% t scoring patches)	96.5	93.0	1.8			& Archi	VES	Page 7			



Colors after 30 Megalux-hours light exposure

Epson Stylus Pro 9600,	Cone Piezotone (custom	blend, Portfolio Black,
K underprint),	Hahnemühle William T	urner 310gsm

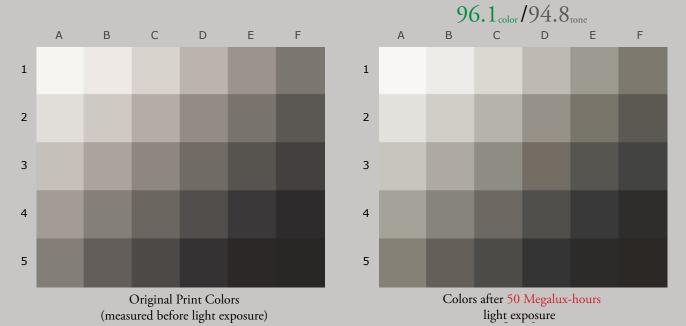
30	30 Mlux-hrs Light Exposure (i.e., after) Compared to Original Print Colors (i.e., before)											
				L	*	а	*	b	*			
Column/row	Color Patch	I*Color	ΔE	Before	After	Before	After	Before	After			
A1	Media White	98.9	0.8	96.6	97.1	0.4	0.4	1.9	1.3			
B1	Highlight L* = 96	99.7	1.0	92.4	93.2	0.7	0.3	2.6	2.2			
C1	Highlight L* = 89	97.9	1.5	84.8	86.1	1.0	0.3	3.6	3.5			
D1	Highlight L* = 78	94.7	2.0	73.9	75.6	1.5	0.5	4.6	4.8			
E1	Midtone L* = 66	93.1	2.2	61.6	63.4	1.6	0.6	4.6	5.2			
F1	Midtone $L^* = 52$	100.0	0.9	50.0	50.8	1.2	0.9	5.5	5.7			
A2	Highlight L* = 92	98.8	1.3	88.3	89.4	0.9	0.4	3.3	3.0			
B2	Highlight L* = 85	96.3	1.7	81.0	82.5	1.2	0.4	4.1	4.1			
C2	Highlight L* = 75	94.2	2.2	71.1	73.0	1.5	0.5	4.7	5.0			
D2	Midtone $L^* = 63$	93.0	2.1	58.5	60.3	1.6	0.7	4.3	5.0			
E2	Midtone $L^* = 50$	100.0	0.8	48.6	49.4	1.2	0.9	5.4	5.7			
F2	Midtone $L^* = 38$	100.0	0.5	37.4	37.8	0.9	0.7	3.4	3.7			
A3	Highlight L* = 82	95.7	1.9	77.9	79.5	1.4	0.5	4.3	4.4			
B3	Midtone $L^* = 72$	93.6	2.1	67.9	69.6	1.6	0.6	4.8	5.1			
C3	Midtone $L^* = 60$	94.2	2.0	56.3	58.0	1.5	0.7	4.3	5.0			
D3	Midtone $L^* = 47$	100.0	0.7	45.5	46.2	1.1	1.0	5.4	5.6			
E3	Midtone $L^* = 35$	100.0	0.5	35.8	36.1	0.8	0.6	2.9	3.1			
F3	Shadow $L^* = 25$	100.0	0.7	27.6	28.2	0.8	0.5	0.6	0.8			
A4	Midtone $L^* = 69$	93.4	2.3	64.7	66.7	1.6	0.6	4.7	5.2			
B4	Midtone L* = 57	96.1	1.7	53.5	55.0	1.4	0.8	4.5	5.1			
C4	Midtone $L^* = 45$	100.0	0.7	43.6	44.3	1.1	0.9	5.2	5.4			
D4	Midtone $L^* = 32$	100.0	0.6	33.3	33.8	0.8	0.5	2.2	2.4			
E4	Shadow $L^* = 20$	100.0	0.5	23.7	24.1	0.8	0.6	0.2	0.2			
F4	Shadow $L^* = 10$	99.8	1.0	17.7	18.6	0.7	0.7	0.4	0.9			
A5	Midtone $L^* = 55$	98.8	1.3	52.9	54.0	1.4	0.9	5.3	5.6			
B5	Midtone $L^* = 41$	100.0	0.5	40.4	40.8	1.0	0.8	4.3	4.5			
C5	Shadow $L^* = 29$	100.0	0.4	31.4	31.7	0.7	0.4	1.6	1.8			
D5	Shadow $L^* = 15$	100.0	0.1	21.2	21.2	0.7	0.6	0.0	0.1			
E5	Shadow $L^* = 5$	97.4	1.1	16.6	17.4	0.7	0.8	0.6	1.4			
F5	Max Black	97.8	1.0	15.7	16.4	0.8	0.9	1.1	1.8			
Summary Results I*Color I*1		I*tone	ΔE									
Average So	Average Score for all patches		95.1	1.2		Ал	RDENBURG					
Average Score for the Worst 10% (3 lowest scoring patches)93.291.92.2& Archives			VES	Page 8								



Epson Stylus Pro 9600, Cone Piezotone (custom blend, Portfolio Black,

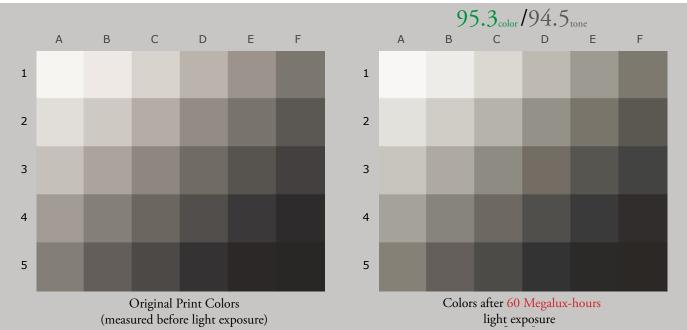
K underprint), Hahnemühle	William	Turner 310gsm
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40	40 Mlux-hrs Light Exposure (i.e., after) Compared to Original Print Colors (i.e., before)											
					*	а		b	*			
Column/row	Color Patch	I*Color	ΔE	Before	After	Before	After	Before	After			
A1	Media White	99.8	0.7	96.6	97.1	0.4	0.4	1.9	1.4			
B1	Highlight L* = 96	99.8	1.0	92.4	93.2	0.7	0.3	2.6	2.3			
C1	Highlight L* = 89	96.4	1.5	84.8	86.1	1.0	0.2	3.6	3.6			
D1	Highlight L* = 78	92.3	2.2	73.9	75.7	1.5	0.3	4.6	4.9			
E1	Midtone L* = 66	90.6	2.4	61.6	63.6	1.6	0.4	4.6	5.2			
F1	Midtone L* = 52	99.8	1.0	50.0	50.9	1.2	0.8	5.5	5.7			
A2	Highlight L* = 92	98.0	1.4	88.3	89.5	0.9	0.2	3.3	3.1			
B2	Highlight L* = 85	94.5	1.9	81.0	82.6	1.2	0.2	4.1	4.2			
C2	Highlight L* = 75	91.8	2.4	71.1	73.1	1.5	0.3	4.7	5.1			
D2	Midtone $L^* = 63$	90.4	2.5	58.5	60.5	1.6	0.4	4.3	5.1			
E2	Midtone $L^* = 50$	100.0	0.9	48.6	49.5	1.2	0.8	5.4	5.7			
F2	Midtone L* = 38	100.0	0.7	37.4	38.0	0.9	0.6	3.4	3.8			
A3	Highlight L* = 82	93.5	2.1	77.9	79.6	1.4	0.3	4.3	4.5			
B3	Midtone L* = 72	90.9	2.3	67.9	69.8	1.6	0.4	4.8	5.3			
C3	Midtone L* = 60	91.8	2.3	56.3	58.3	1.5	0.5	4.3	5.1			
D3	Midtone L* = 47	100.0	0.8	45.5	46.3	1.1	0.9	5.4	5.6			
E3	Midtone $L^* = 35$	100.0	0.7	35.8	36.3	0.8	0.5	2.9	3.2			
F3	Shadow $L^* = 25$	100.0	0.9	27.6	28.4	0.8	0.4	0.6	0.8			
A4	Midtone $L^* = 69$	90.8	2.5	64.7	66.8	1.6	0.4	4.7	5.3			
B4	Midtone $L^* = 57$	94.3	1.9	53.5	55.1	1.4	0.6	4.5	5.2			
C4	Midtone $L^* = 45$	100.0	0.8	43.6	44.4	1.1	0.8	5.2	5.4			
D4	Midtone $L^* = 32$	100.0	0.7	33.3	33.8	0.8	0.4	2.2	2.4			
E4	Shadow $L^* = 20$	100.0	0.7	23.7	24.3	0.8	0.5	0.2	0.2			
F4	Shadow $L^* = 10$	100.0	1.0	17.7	18.6	0.7	0.6	0.4	0.9			
A5	Midtone $L^* = 55$	97.4	1.4	52.9	54.2	1.4	0.8	5.3	5.7			
B5	Midtone $L^* = 41$	100.0	0.7	40.4	41.0	1.0	0.7	4.3	4.6			
C5	Shadow $L^* = 29$	100.0	0.6	31.4	31.8	0.7	0.3	1.6	1.8			
D5	Shadow $L^* = 15$	100.0	0.5	21.2	21.6	0.7	0.5	0.0	0.1			
E5	Shadow $L^* = 5$	98.4	1.0	16.6	17.4	0.7	0.7	0.6	1.3			
F5	Max Black	98.0	0.9	15.7	16.3	0.8	0.9	1.1	1.7			
Sumr	Summary Results I*Color		I*tone	ΔE		~						
Average So	Average Score for all patches		95.2	1.3		Ал	RDENBURG					
	re for the Worst 10% scoring patches)	90.6	91.7	2.5	2.5 & Archives			VES	Page 9			



Epson Stylus Pro 9600, Cone Piezotone (custom blend, Portfolio Black, K underprint), Hahnemühle William Turner 310gsm

50	Mlux-hrs Light l	Exposure	(i.e., after)	Compare	ed to Ori	ginal Pri	nt Color	S (i.e., befor	e)
				L	*	a	*	b	*
Column/row	Color Patch	I*Color	ΔE	Before	After	Before	After	Before	After
A1	Media White	100.0	0.7	96.6	97.1	0.4	0.3	1.9	1.5
B1	Highlight L* = 96	99.9	1.0	92.4	93.2	0.7	0.2	2.6	2.4
C1	Highlight L* = 89	95.7	1.8	84.8	86.3	1.0	0.1	3.6	3.7
D1	Highlight L* = 78	90.4	2.4	73.9	75.8	1.5	0.1	4.6	5.0
E1	Midtone L* = 66	88.4	2.7	61.6	63.7	1.6	0.2	4.6	5.3
F1	Midtone L* = 52	98.6	1.2	50.0	50.9	1.2	0.7	5.5	5.8
A2	Highlight L* = 92	97.4	1.4	88.3	89.4	0.9	0.2	3.3	3.2
B2	Highlight L* = 85	93.2	2.0	81.0	82.6	1.2	0.1	4.1	4.2
C2	Highlight L* = 75	89.8	2.4	71.1	73.1	1.5	0.1	4.7	5.2
D2	Midtone L* = 63	88.2	2.7	58.5	60.6	1.6	0.2	4.3	5.1
E2	Midtone $L^* = 50$	99.5	1.1	48.6	49.5	1.2	0.7	5.4	5.7
F2	Midtone L* = 38	99.7	0.8	37.4	38.0	0.9	0.5	3.4	3.8
A3	Highlight L* = 82	91.9	2.2	77.9	79.7	1.4	0.1	4.3	4.6
B3	Midtone $L^* = 72$	88.9	2.6	67.9	69.9	1.6	0.2	4.8	5.4
C3	Midtone $L^* = 60$	89.8	2.4	56.3	58.3	1.5	0.3	4.3	5.1
D3	Midtone L* = 47	100.0	0.8	45.5	46.3	1.1	0.8	5.4	5.6
E3	Midtone $L^* = 35$	99.3	0.7	35.8	36.2	0.8	0.3	2.9	3.2
F3	Shadow $L^* = 25$	98.1	1.0	27.6	28.4	0.8	0.2	0.6	0.8
A4	Midtone $L^* = 69$	88.5	2.7	64.7	66.8	1.6	0.2	4.7	5.3
B4	Midtone $L^* = 57$	92.7	2.0	53.5	55.2	1.4	0.4	4.5	5.2
C4	Midtone $L^* = 45$	100.0	0.9	43.6	44.5	1.1	0.8	5.2	5.4
D4	Midtone $L^* = 32$	99.1	0.7	33.3	33.7	0.8	0.2	2.2	2.4
E4	Shadow $L^* = 20$	100.0	0.6	23.7	24.1	0.8	0.4	0.2	0.1
F4	Shadow $L^* = 10$	100.0	1.0	17.7	18.6	0.7	0.6	0.4	0.8
A5	Midtone L* = 55	96.2	1.5	52.9	54.2	1.4	0.6	5.3	5.7
B5	Midtone $L^* = 41$	100.0	0.7	40.4	41.0	1.0	0.6	4.3	4.6
C5	Shadow $L^* = 29$	99.4	0.7	31.4	31.8	0.7	0.2	1.6	1.8
D5	Shadow $L^* = 15$	100.0	0.4	21.2	21.5	0.7	0.5	0.0	0.0
E5	Shadow $L^* = 5$	98.4	1.1	16.6	17.5	0.7	0.7	0.6	1.3
F5	Max Black	98.5	1.0	15.7	16.4	0.8	0.8	1.1	1.7
Sumr	mary Results	I*Color	I*tone	ΔE					
Average So	core for all patches	96.1	94.8	1.4		Ал	RDENBURG		
Average Score for the Worst 10% (3 lowest scoring patches)88.491.72.7& Archives				VES	Page 10				



Colors after 60 Megalux-hours light exposure

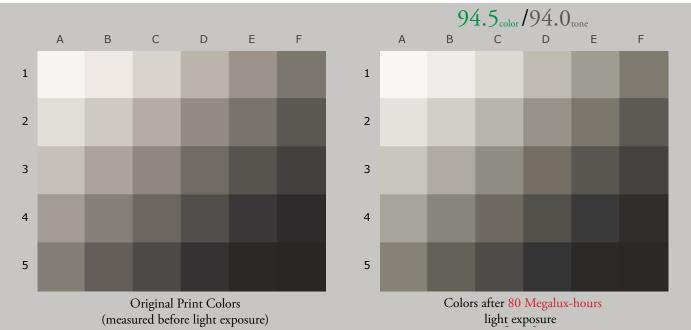
Epson Stylus Pro 9600,	Cone Piezotone (cu	istom blend, I	Portfolio Black,
K underprint),	Hahnemühle Will	iam Turner 3	10gsm

60	60 Mlux-hrs Light Exposure (i.e., after) Compared to Original Print Colors (i.e., before)									
					*	a	*	b	*	
Column/row	Color Patch	I*Color	ΔE	Before	After	Before	After	Before	After	
A1	Media White	99.6	0.7	96.6	97.1	0.4	0.4	1.9	1.3	
B1	Highlight L* = 96	99.0	1.0	92.4	93.2	0.7	0.2	2.6	2.2	
C1	Highlight L* = 89	94.9	1.7	84.8	86.2	1.0	0.0	3.6	3.5	
D1	Highlight L* = 78	89.5	2.5	73.9	75.8	1.5	0.0	4.6	4.9	
E1	Midtone L* = 66	87.0	2.6	61.6	63.5	1.6	0.0	4.6	5.2	
F1	Midtone $L^* = 52$	97.9	1.2	50.0	51.0	1.2	0.6	5.5	5.7	
A2	Highlight L* = 92	97.0	1.4	88.3	89.4	0.9	0.1	3.3	3.1	
B2	Highlight L* = 85	92.4	1.9	81.0	82.5	1.2	0.0	4.1	4.2	
C2	Highlight L* = 75	88.7	2.5	71.1	73.1	1.5	0.0	4.7	5.1	
D2	Midtone $L^* = 63$	86.9	2.7	58.5	60.6	1.6	0.0	4.3	5.1	
E2	Midtone $L^* = 50$	98.9	0.9	48.6	49.3	1.2	0.6	5.4	5.6	
F2	Midtone L* = 38	99.1	0.7	37.4	37.8	0.9	0.3	3.4	3.7	
A3	Highlight L* = 82	91.1	2.1	77.9	79.5	1.4	0.0	4.3	4.5	
B3	Midtone L* = 72	87.6	2.5	67.9	69.8	1.6	0.0	4.8	5.2	
C3	Midtone $L^* = 60$	88.6	2.5	56.3	58.2	1.5	0.1	4.3	5.1	
D3	Midtone L* = 47	100.0	0.7	45.5	46.1	1.1	0.7	5.4	5.5	
E3	Midtone $L^* = 35$	98.3	0.8	35.8	36.2	0.8	0.2	2.9	3.2	
F3	Shadow $L^* = 25$	96.6	1.0	27.6	28.3	0.8	0.0	0.6	0.8	
A4	Midtone $L^* = 69$	87.4	2.7	64.7	66.8	1.6	0.0	4.7	5.3	
B4	Midtone L* = 57	91.5	2.1	53.5	55.1	1.4	0.3	4.5	5.2	
C4	Midtone $L^* = 45$	100.0	0.9	43.6	44.4	1.1	0.7	5.2	5.3	
D4	Midtone $L^* = 32$	98.1	0.8	33.3	33.7	0.8	0.1	2.2	2.4	
E4	Shadow $L^* = 20$	98.8	0.8	23.7	24.1	0.8	0.2	0.2	0.1	
F4	Shadow $L^* = 10$	100.0	1.2	17.7	18.8	0.7	0.6	0.4	0.8	
A5	Midtone $L^* = 55$	95.5	1.4	52.9	54.0	1.4	0.5	5.3	5.6	
B5	Midtone $L^* = 41$	100.0	0.6	40.4	40.8	1.0	0.5	4.3	4.4	
C5	Shadow $L^* = 29$	98.4	0.7	31.4	31.6	0.7	0.0	1.6	1.7	
D5	Shadow $L^* = 15$	100.0	0.4	21.2	21.2	0.7	0.3	0.0	-0.1	
E5	Shadow $L^* = 5$	99.1	0.9	16.6	17.4	0.7	0.7	0.6	1.2	
F5	Max Black	97.7	1.0	15.7	16.4	0.8	0.7	1.1	1.8	
Sumr	mary Results	I*Color	I*tone	ΔE						
Average So	95.3	94.5	1.4		Ал	RDENBURG				
	<i>re for the Worst 10%</i> t scoring patches)	87.1	91.7	2.7			& Archi	VES	Page 11	



Epson Stylus Pro 9600, Cone Piezotone (custom blend, Portfolio Black, K underprint), Hahnemühle William Turner 310gsm

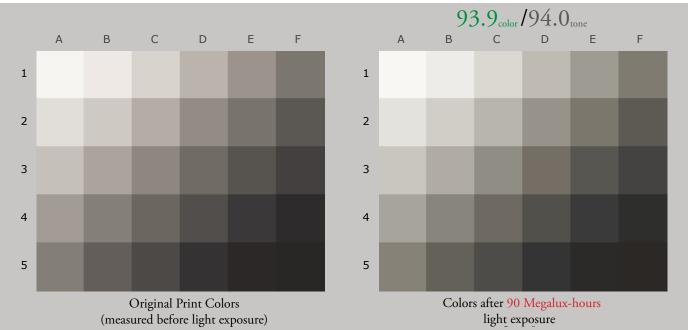
70	70 Mlux-hrs Light Exposure (i.e., after) Compared to Original Print Colors (i.e., before)										
				L	*	a	*	b	*		
Column/row	Color Patch	I*Color	ΔE	Before	After	Before	After	Before	After		
A1	Media White	98.4	0.9	96.6	97.2	0.4	0.4	1.9	1.2		
B1	Highlight L* = 96	98.5	1.2	92.4	93.4	0.7	0.2	2.6	2.1		
C1	Highlight L* = 89	95.1	2.0	84.8	86.5	1.0	0.1	3.6	3.5		
D1	Highlight L* = 78	89.1	2.7	73.9	76.1	1.5	-0.1	4.6	4.8		
E1	Midtone L* = 66	86.1	3.0	61.6	63.9	1.6	-0.1	4.6	5.2		
F1	Midtone $L^* = 52$	97.5	1.6	50.0	51.3	1.2	0.5	5.5	5.7		
A2	Highlight L* = 92	96.7	1.7	88.3	89.7	0.9	0.1	3.3	3.0		
B2	Highlight L* = 85	92.2	2.3	81.0	82.9	1.2	0.0	4.1	4.1		
C2	Highlight L* = 75	88.2	2.9	71.1	73.6	1.5	-0.1	4.7	5.0		
D2	Midtone L* = 63	85.9	3.1	58.5	61.0	1.6	-0.1	4.3	5.1		
E2	Midtone L* = 50	98.3	1.3	48.6	49.8	1.2	0.6	5.4	5.7		
F2	Midtone L* = 38	98.3	0.9	37.4	38.0	0.9	0.3	3.4	3.7		
A3	Highlight L* = 82	90.7	2.5	77.9	79.9	1.4	0.0	4.3	4.4		
B3	Midtone L* = 72	86.8	2.9	67.9	70.2	1.6	-0.1	4.8	5.2		
C3	Midtone $L^* = 60$	87.6	2.8	56.3	58.6	1.5	0.1	4.3	5.1		
D3	Midtone $L^* = 47$	100.0	1.0	45.5	46.4	1.1	0.7	5.4	5.6		
E3	Midtone $L^* = 35$	97.5	1.0	35.8	36.4	0.8	0.2	2.9	3.2		
F3	Shadow L* = 25	95.2	1.4	27.6	28.6	0.8	-0.1	0.6	0.9		
A4	Midtone $L^* = 69$	86.6	3.2	64.7	67.3	1.6	-0.1	4.7	5.3		
B4	Midtone L* = 57	90.7	2.4	53.5	55.5	1.4	0.2	4.5	5.2		
C4	Midtone $L^* = 45$	100.0	1.1	43.6	44.7	1.1	0.6	5.2	5.4		
D4	Midtone $L^* = 32$	97.2	1.1	33.3	34.0	0.8	0.0	2.2	2.4		
E4	Shadow $L^* = 20$	98.1	1.1	23.7	24.5	0.8	0.1	0.2	0.1		
F4	Shadow $L^* = 10$	100.0	1.1	17.7	18.7	0.7	0.5	0.4	0.7		
A5	Midtone $L^* = 55$	94.7	1.8	52.9	54.5	1.4	0.4	5.3	5.6		
B5	Midtone $L^* = 41$	99.9	0.9	40.4	41.2	1.0	0.5	4.3	4.5		
C5	Shadow $L^* = 29$	97.4	1.0	31.4	32.0	0.7	0.0	1.6	1.8		
D5	Shadow $L^* = 15$	100.0	0.5	21.2	21.3	0.7	0.3	0.0	0.0		
E5	Shadow $L^* = 5$	100.0	1.0	16.6	17.5	0.7	0.6	0.6	1.1		
F5	Max Black	98.8	1.0	15.7	16.5	0.8	0.7	1.1	1.7		
Sumr	mary Results	I*Color	I*tone	ΔE							
Average So	core for all patches	94.9	94.0	1.7		AA	RDENBURG				
	re for the Worst 10% t scoring patches)	86.2	90.9	3.1			& Archi	VES	Page 12		



Colors after 80 Megalux-hours light exposure

Epson Stylus Pro 9600,	Cone Piezotone (custom bl	end, Portfolio Black,
K underprint),	Hahnemühle William Tur	rner 310gsm

80	80 Mlux-hrs Light Exposure (i.e., after) Compared to Original Print Colors (i.e., before)										
				L	*	a	*	b	*		
Column/row	Color Patch	I*Color	ΔE	Before	After	Before	After	Before	After		
A1	Media White	99.8	0.8	96.6	97.2	0.4	0.4	1.9	1.4		
B1	Highlight L* = 96	99.2	1.2	92.4	93.4	0.7	0.2	2.6	2.2		
C1	Highlight L* = 89	95.3	2.0	84.8	86.5	1.0	0.1	3.6	3.6		
D1	Highlight L* = 78	88.7	2.8	73.9	76.2	1.5	-0.1	4.6	4.9		
E1	Midtone L* = 66	85.4	3.3	61.6	64.2	1.6	-0.1	4.6	5.3		
F1	Midtone $L^* = 52$	97.0	1.8	50.0	51.6	1.2	0.5	5.5	5.8		
A2	Highlight L* = 92	96.9	1.6	88.3	89.6	0.9	0.1	3.3	3.0		
B2	Highlight L* = 85	92.2	2.4	81.0	83.0	1.2	0.0	4.1	4.1		
C2	Highlight L* = 75	87.6	2.9	71.1	73.5	1.5	-0.1	4.7	5.1		
D2	Midtone $L^* = 63$	84.9	3.2	58.5	61.1	1.6	-0.1	4.3	5.2		
E2	Midtone $L^* = 50$	97.7	1.6	48.6	50.1	1.2	0.6	5.4	5.8		
F2	Midtone L* = 38	97.4	1.1	37.4	38.3	0.9	0.3	3.4	3.9		
A3	Highlight L* = 82	90.6	2.6	77.9	80.1	1.4	0.0	4.3	4.6		
B3	Midtone $L^* = 72$	86.2	3.1	67.9	70.4	1.6	-0.1	4.8	5.3		
C3	Midtone L* = 60	86.7	3.1	56.3	58.9	1.5	0.0	4.3	5.2		
D3	Midtone L* = 47	99.5	1.2	45.5	46.6	1.1	0.6	5.4	5.7		
E3	Midtone $L^* = 35$	96.7	1.2	35.8	36.6	0.8	0.1	2.9	3.3		
F3	Shadow $L^* = 25$	94.4	1.4	27.6	28.7	0.8	-0.2	0.6	1.0		
A4	Midtone $L^* = 69$	85.7	3.3	64.7	67.4	1.6	-0.1	4.7	5.3		
B4	Midtone L* = 57	89.8	2.6	53.5	55.6	1.4	0.1	4.5	5.2		
C4	Midtone $L^* = 45$	100.0	1.2	43.6	44.8	1.1	0.7	5.2	5.4		
D4	Midtone $L^* = 32$	96.2	1.2	33.3	34.1	0.8	0.0	2.2	2.5		
E4	Shadow $L^* = 20$	97.5	1.0	23.7	24.4	0.8	0.1	0.2	0.2		
F4	Shadow $L^* = 10$	100.0	1.1	17.7	18.8	0.7	0.5	0.4	0.6		
A5	Midtone $L^* = 55$	93.8	2.0	52.9	54.5	1.4	0.4	5.3	5.7		
B5	Midtone $L^* = 41$	99.2	1.0	40.4	41.2	1.0	0.5	4.3	4.6		
C5	Shadow $L^* = 29$	96.4	1.1	31.4	32.1	0.7	-0.1	1.6	2.0		
D5	Shadow $L^* = 15$	100.0	0.6	21.2	21.5	0.7	0.2	0.0	-0.1		
E5	Shadow $L^* = 5$	100.0	0.8	16.6	17.4	0.7	0.6	0.6	1.0		
F5	Max Black	99.9	0.9	15.7	16.4	0.8	0.7	1.1	1.6		
Sumr	mary Results	I*Color	I*tone	ΔE		2					
Average So	core for all patches	94.5	94.0	1.8		Ал	RDENBURG				
	re for the Worst 10% t scoring patches)	85.3	90.5	3.3			& Archi	VES	Page 13		



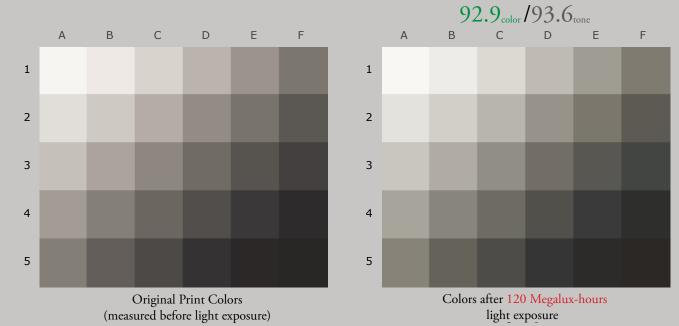
Epson Stylus Pro 9600,	Cone Piezotone (custom blend, Portfolio Black,
K underprint),	Hahnemühle William Turner 310gsm

90	90 Mlux-hrs Light Exposure (i.e., after) Compared to Original Print Colors (i.e., before)										
					*	a	*	b	*		
Column/row	Color Patch	I*Color	ΔE	Before	After	Before	After	Before	After		
A1	Media White	100.0	0.8	96.6	97.2	0.4	0.3	1.9	1.6		
B1	Highlight L* = 96	99.9	1.1	92.4	93.3	0.7	0.2	2.6	2.4		
C1	Highlight L* = 89	94.8	1.9	84.8	86.5	1.0	0.0	3.6	3.7		
D1	Highlight L* = 78	88.0	2.8	73.9	76.2	1.5	-0.1	4.6	5.0		
E1	Midtone L* = 66	84.3	3.2	61.6	64.1	1.6	-0.2	4.6	5.4		
F1	Midtone $L^* = 52$	96.3	1.8	50.0	51.6	1.2	0.5	5.5	5.8		
A2	Highlight L* = 92	96.9	1.6	88.3	89.7	0.9	0.1	3.3	3.2		
B2	Highlight L* = 85	91.7	2.3	81.0	82.9	1.2	0.0	4.1	4.3		
C2	Highlight L* = 75	86.9	3.0	71.1	73.6	1.5	-0.2	4.7	5.2		
D2	Midtone L* = 63	83.8	3.3	58.5	61.1	1.6	-0.2	4.3	5.2		
E2	Midtone $L^* = 50$	97.5	1.6	48.6	50.1	1.2	0.5	5.4	5.7		
F2	Midtone L* = 38	97.3	1.1	37.4	38.3	0.9	0.2	3.4	3.8		
A3	Highlight L* = 82	90.2	2.6	77.9	80.0	1.4	-0.1	4.3	4.6		
B3	Midtone L* = 72	85.5	3.2	67.9	70.4	1.6	-0.2	4.8	5.4		
C3	Midtone $L^* = 60$	85.7	3.1	56.3	58.8	1.5	-0.1	4.3	5.2		
D3	Midtone L* = 47	99.0	1.2	45.5	46.6	1.1	0.6	5.4	5.7		
E3	Midtone $L^* = 35$	95.8	1.2	35.8	36.6	0.8	0.0	2.9	3.3		
F3	Shadow $L^* = 25$	93.2	1.6	27.6	28.7	0.8	-0.3	0.6	1.0		
A4	Midtone L* = 69	84.8	3.4	64.7	67.4	1.6	-0.2	4.7	5.4		
B4	Midtone L* = 57	88.8	2.7	53.5	55.7	1.4	0.1	4.5	5.3		
C4	Midtone $L^* = 45$	99.8	1.3	43.6	44.9	1.1	0.6	5.2	5.4		
D4	Midtone $L^* = 32$	95.4	1.2	33.3	34.0	0.8	-0.1	2.2	2.6		
E4	Shadow $L^* = 20$	96.5	1.0	23.7	24.3	0.8	0.0	0.2	0.2		
F4	Shadow $L^* = 10$	100.0	1.1	17.7	18.8	0.7	0.5	0.4	0.6		
A5	Midtone L* = 55	93.2	2.0	52.9	54.5	1.4	0.3	5.3	5.7		
B5	Midtone L* = 41	98.8	1.1	40.4	41.3	1.0	0.4	4.3	4.6		
C5	Shadow $L^* = 29$	95.7	1.2	31.4	32.2	0.7	-0.2	1.6	1.9		
D5	Shadow $L^* = 15$	99.5	0.7	21.2	21.6	0.7	0.2	0.0	-0.1		
E5	Shadow $L^* = 5$	100.0	0.9	16.6	17.4	0.7	0.6	0.6	1.0		
F5	Max Black	99.3	1.0	15.7	16.5	0.8	0.8	1.1	1.6		
Sumr	mary Results	I*Color	I*tone	ΔE							
Average So	core for all patches	93.9	94.0	1.8		AA	RDENBURG				
	re for the Worst 10% t scoring patches)	84.3	90.9	3.3			& Archi	VES	Page 14		



Epson Stylus Pro 9600, Cone Piezotone (custom blend, Portfolio Black, K underprint), Hahnemühle William Turner 310gsm

100	100 Mlux-hrs Light Exposure (i.e., after) Compared to Original Print Colors (i.e., before)										
					*	a		b			
Column/row	Color Patch	I*Color	ΔE	Before	After	Before	After	Before	After		
A1	Media White	100.0	1.0	96.6	97.4	0.4	0.3	1.9	1.4		
B1	Highlight L* = 96	99.1	1.3	92.4	93.5	0.7	0.2	2.6	2.3		
C1	Highlight L* = 89	94.6	2.1	84.8	86.7	1.0	0.0	3.6	3.6		
D1	Highlight L* = 78	87.8	3.0	73.9	76.3	1.5	-0.2	4.6	4.9		
E1	Midtone $L^* = 66$	83.7	3.4	61.6	64.2	1.6	-0.3	4.6	5.3		
F1	Midtone $L^* = 52$	95.9	1.8	50.0	51.5	1.2	0.4	5.5	5.7		
A2	Highlight L* = 92	96.7	1.8	88.3	89.9	0.9	0.1	3.3	3.1		
B2	Highlight L* = 85	91.6	2.4	81.0	83.1	1.2	-0.1	4.1	4.2		
C2	Highlight L* = 75	86.6	3.2	71.1	73.8	1.5	-0.2	4.7	5.2		
D2	Midtone $L^* = 63$	83.4	3.5	58.5	61.4	1.6	-0.3	4.3	5.2		
E2	Midtone L* = 50	96.8	1.6	48.6	50.1	1.2	0.5	5.4	5.7		
F2	Midtone $L^* = 38$	96.5	1.3	37.4	38.4	0.9	0.1	3.4	3.8		
A3	Highlight L* = 82	89.7	2.7	77.9	80.1	1.4	-0.1	4.3	4.5		
B3	Midtone L* = 72	85.2	3.3	67.9	70.6	1.6	-0.2	4.8	5.3		
C3	Midtone $L^* = 60$	85.2	3.3	56.3	59.0	1.5	-0.2	4.3	5.1		
D3	Midtone L* = 47	98.7	1.3	45.5	46.7	1.1	0.5	5.4	5.6		
E3	Midtone $L^* = 35$	95.7	1.4	35.8	36.8	0.8	0.0	2.9	3.2		
F3	Shadow $L^* = 25$	92.2	1.7	27.6	28.8	0.8	-0.4	0.6	0.9		
A4	Midtone L* = 69	84.4	3.4	64.7	67.4	1.6	-0.3	4.7	5.3		
B4	Midtone L* = 57	88.3	2.8	53.5	55.8	1.4	0.0	4.5	5.2		
C4	Midtone L* = 45	99.7	1.4	43.6	44.9	1.1	0.6	5.2	5.4		
D4	Midtone $L^* = 32$	94.7	1.3	33.3	34.1	0.8	-0.2	2.2	2.5		
E4	Shadow $L^* = 20$	95.7	1.2	23.7	24.4	0.8	-0.1	0.2	0.2		
F4	Shadow $L^* = 10$	100.0	1.0	17.7	18.7	0.7	0.5	0.4	0.6		
A5	Midtone $L^* = 55$	92.9	2.1	52.9	54.7	1.4	0.3	5.3	5.7		
B5	Midtone $L^* = 41$	98.6	1.1	40.4	41.3	1.0	0.4	4.3	4.5		
C5	Shadow $L^* = 29$	95.0	1.3	31.4	32.2	0.7	-0.3	1.6	1.9		
D5	Shadow $L^* = 15$	99.4	0.7	21.2	21.7	0.7	0.2	0.0	-0.1		
E5	Shadow $L^* = 5$	100.0	1.0	16.6	17.6	0.7	0.6	0.6	1.0		
F5	Max Black	100.0	1.0	15.7	16.5	0.8	0.7	1.1	1.6		
	nary Results	I*Color	I*tone	ΔE							
Average Sc	core for all patches	93.6	93.8	1.9		Ал	RDENBURG				
	re for the Worst 10% scoring patches)	83.8	90.5	3.4			& Archi	VES	Page 15		



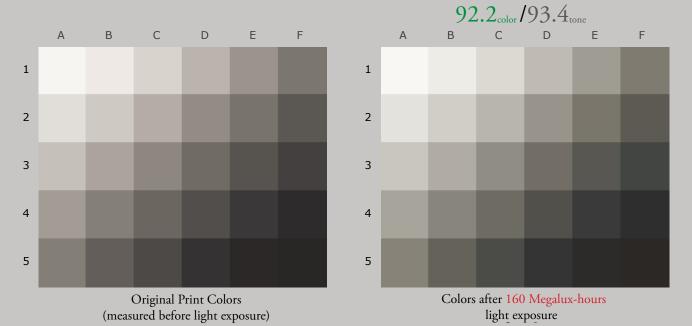
Epson Stylus Pro 9600, Cone Piezotone (custom blend, Portfolio Black, K underprint), Hahnemühle William Turner 310gsm

120	120 Mlux-hrs Light Exposure (i.e., after) Compared to Original Print Colors (i.e., before)										
				L	*	a	*	b	*		
Column/row	Color Patch	I*Color	ΔE	Before	After	Before	After	Before	After		
A1	Media White	100.0	0.8	96.6	97.3	0.4	0.3	1.9	1.5		
B1	Highlight L* = 96	99.2	1.2	92.4	93.5	0.7	0.2	2.6	2.3		
C1	Highlight L* = 89	94.3	2.0	84.8	86.5	1.0	0.0	3.6	3.6		
D1	Highlight L* = 78	87.4	2.9	73.9	76.2	1.5	-0.2	4.6	4.9		
E1	Midtone L* = 66	82.9	3.5	61.6	64.4	1.6	-0.4	4.6	5.3		
F1	Midtone $L^* = 52$	95.0	1.9	50.0	51.7	1.2	0.3	5.5	5.7		
A2	Highlight L* = 92	96.4	1.7	88.3	89.7	0.9	0.1	3.3	3.1		
B2	Highlight L* = 85	91.2	2.5	81.0	83.1	1.2	-0.1	4.1	4.2		
C2	Highlight L* = 75	86.0	3.2	71.1	73.8	1.5	-0.3	4.7	5.1		
D2	Midtone $L^* = 63$	82.5	3.6	58.5	61.3	1.6	-0.4	4.3	5.2		
E2	Midtone $L^* = 50$	96.2	1.7	48.6	50.1	1.2	0.4	5.4	5.7		
F2	Midtone L* = 38	95.4	1.4	37.4	38.5	0.9	0.0	3.4	3.8		
A3	Highlight L* = 82	89.3	2.7	77.9	80.1	1.4	-0.1	4.3	4.6		
B3	Midtone $L^* = 72$	84.3	3.3	67.9	70.5	1.6	-0.3	4.8	5.3		
C3	Midtone $L^* = 60$	84.2	3.4	56.3	59.1	1.5	-0.3	4.3	5.2		
D3	Midtone $L^* = 47$	98.0	1.4	45.5	46.7	1.1	0.5	5.4	5.6		
E3	Midtone $L^* = 35$	94.6	1.4	35.8	36.8	0.8	-0.1	2.9	3.3		
F3	Shadow $L^* = 25$	90.3	1.9	27.6	28.9	0.8	-0.6	0.6	1.0		
A4	Midtone $L^* = 69$	83.6	3.5	64.7	67.5	1.6	-0.3	4.7	5.3		
B4	Midtone $L^* = 57$	87.4	2.9	53.5	55.8	1.4	-0.1	4.5	5.3		
C4	Midtone $L^* = 45$	98.9	1.5	43.6	45.0	1.1	0.5	5.2	5.4		
D4	Midtone $L^* = 32$	93.5	1.4	33.3	34.2	0.8	-0.3	2.2	2.6		
E4	Shadow $L^* = 20$	94.2	1.3	23.7	24.5	0.8	-0.2	0.2	0.2		
F4	Shadow $L^* = 10$	100.0	1.1	17.7	18.8	0.7	0.4	0.4	0.5		
A5	Midtone $L^* = 55$	92.0	2.3	52.9	54.8	1.4	0.2	5.3	5.7		
B5	Midtone L* = 41	97.5	1.3	40.4	41.5	1.0	0.3	4.3	4.6		
C5	Shadow $L^* = 29$	93.7	1.5	31.4	32.5	0.7	-0.4	1.6	2.0		
D5	Shadow $L^* = 15$	98.2	0.9	21.2	21.8	0.7	0.0	0.0	-0.1		
E5	Shadow $L^* = 5$	100.0	1.0	16.6	17.6	0.7	0.5	0.6	0.9		
F5	Max Black	100.0	1.0	15.7	16.5	0.8	0.7	1.1	1.6		
Sumr	mary Results	I*Color	I*tone	ΔE		•					
Average Sc	core for all patches	92.9	93.6	2.0		Ал	RDENBURG				
	re for the Worst 10% t scoring patches)	83.0	90.5	5 3.5 & Archives Pa				Page 16			



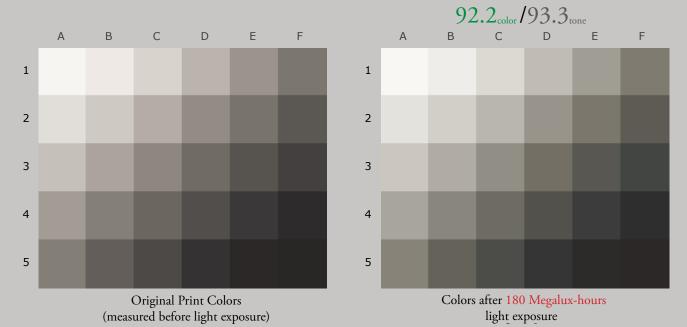
Epson Stylus Pro 9600, Cone Piezotone (custom blend, Portfolio Black, K underprint), Hahnemühle William Turner 310gsm

140	Mlux-hrs Light	Exposure	e (i.e., after)	L		0			
					*	a		b	
Column/row	Color Patch	I*Color	ΔE	Before	After	Before	After	Before	After
A1	Media White	100.0	0.9	96.6	97.3	0.4	0.3	1.9	1.4
B1	Highlight L* = 96	99.4	1.2	92.4	93.4	0.7	0.2	2.6	2.3
C1	Highlight L* = 89	94.8	2.0	84.8	86.5	1.0	0.0	3.6	3.6
D1	Highlight L* = 78	87.8	2.9	73.9	76.3	1.5	-0.2	4.6	4.9
E1	Midtone L* = 66	83.1	3.6	61.6	64.5	1.6	-0.4	4.6	5.3
F1	Midtone L* = 52	95.0	2.1	50.0	51.8	1.2	0.3	5.5	5.7
A2	Highlight L* = 92	96.6	1.7	88.3	89.7	0.9	0.1	3.3	3.1
B2	Highlight L* = 85	91.7	2.5	81.0	83.1	1.2	-0.1	4.1	4.1
C2	Highlight L* = 75	86.4	3.3	71.1	73.9	1.5	-0.2	4.7	5.1
D2	Midtone $L^* = 63$	82.5	3.6	58.5	61.4	1.6	-0.4	4.3	5.2
E2	Midtone $L^* = 50$	96.0	1.8	48.6	50.2	1.2	0.4	5.4	5.7
F2	Midtone $L^* = 38$	94.9	1.4	37.4	38.5	0.9	0.0	3.4	3.9
A3	Highlight L* = 82	89.9	2.8	77.9	80.2	1.4	-0.1	4.3	4.5
B3	Midtone L* = 72	84.8	3.4	67.9	70.7	1.6	-0.3	4.8	5.3
C3	Midtone $L^* = 60$	84.0	3.5	56.3	59.2	1.5	-0.3	4.3	5.2
D3	Midtone L* = 47	97.9	1.4	45.5	46.8	1.1	0.5	5.4	5.6
E3	Midtone $L^* = 35$	93.8	1.5	35.8	36.9	0.8	-0.2	2.9	3.4
F3	Shadow $L^* = 25$	89.3	2.0	27.6	29.0	0.8	-0.6	0.6	1.0
A4	Midtone $L^* = 69$	83.9	3.6	64.7	67.6	1.6	-0.3	4.7	5.3
B4	Midtone L* = 57	87.3	3.0	53.5	55.9	1.4	-0.1	4.5	5.3
C4	Midtone $L^* = 45$	98.9	1.6	43.6	45.1	1.1	0.5	5.2	5.4
D4	Midtone $L^* = 32$	92.7	1.6	33.3	34.3	0.8	-0.4	2.2	2.6
E4	Shadow $L^* = 20$	93.5	1.4	23.7	24.4	0.8	-0.3	0.2	0.2
F4	Shadow $L^* = 10$	100.0	1.0	17.7	18.7	0.7	0.4	0.4	0.5
A5	Midtone L* = 55	91.7	2.2	52.9	54.8	1.4	0.2	5.3	5.7
B5	Midtone L* = 41	97.3	1.3	40.4	41.5	1.0	0.3	4.3	4.6
C5	Shadow $L^* = 29$	92.7	1.6	31.4	32.4	0.7	-0.4	1.6	2.1
D5	Shadow $L^* = 15$	97.8	0.7	21.2	21.5	0.7	0.0	0.0	-0.1
E5	Shadow $L^* = 5$	100.0	0.9	16.6	17.5	0.7	0.6	0.6	0.8
 F5	Max Black	100.0	1.2	15.7	16.7	0.8	0.7	1.1	1.5
	nary Results	I*Color	I*tone	ΔE				, ,	
Average So	core for all patches	92.8	93.4	2.1		Ал	RDENBURG		
	re for the Worst 10% scoring patches)	83.1	90.1	3.6			& Archi	VES	Page 17



Epson Stylus Pro 9600, Cone Piezotone (custom blend, Portfolio Black, K underprint), Hahnemühle William Turner 310gsm

160	160 Mlux-hrs Light Exposure (i.e., after) Compared to Original Print Colors (i.e., before)										
					*	a		b			
Column/row	Color Patch	I*Color	ΔE	Before	After	Before	After	Before	After		
A1	Media White	100.0	0.6	96.6	97.1	0.4	0.3	1.9	1.8		
B1	Highlight L* = 96	99.9	1.2	92.4	93.5	0.7	0.2	2.6	2.7		
C1	Highlight L* = 89	94.3	2.1	84.8	86.6	1.0	0.0	3.6	3.9		
D1	Highlight L* = 78	86.8	2.9	73.9	76.2	1.5	-0.2	4.6	5.1		
E1	Midtone L* = 66	82.1	3.5	61.6	64.3	1.6	-0.4	4.6	5.4		
F1	Midtone $L^* = 52$	94.3	2.1	50.0	51.8	1.2	0.3	5.5	5.8		
A2	Highlight L* = 92	96.5	1.7	88.3	89.7	0.9	0.1	3.3	3.4		
B2	Highlight L* = 85	91.0	2.3	81.0	82.9	1.2	-0.1	4.1	4.4		
C2	Highlight L* = 75	85.7	3.2	71.1	73.8	1.5	-0.2	4.7	5.3		
D2	Midtone $L^* = 63$	81.5	3.7	58.5	61.4	1.6	-0.4	4.3	5.3		
E2	Midtone $L^* = 50$	95.1	1.6	48.6	50.0	1.2	0.3	5.4	5.8		
F2	Midtone $L^* = 38$	94.4	1.4	37.4	38.4	0.9	-0.1	3.4	3.8		
A3	Highlight L* = 82	89.1	2.7	77.9	80.0	1.4	-0.1	4.3	4.7		
B3	Midtone $L^* = 72$	83.8	3.3	67.9	70.5	1.6	-0.3	4.8	5.4		
C3	Midtone $L^* = 60$	83.1	3.4	56.3	59.0	1.5	-0.4	4.3	5.2		
D3	Midtone L* = 47	97.5	1.4	45.5	46.7	1.1	0.4	5.4	5.6		
E3	Midtone $L^* = 35$	93.1	1.5	35.8	36.8	0.8	-0.3	2.9	3.3		
F3	Shadow $L^* = 25$	87.9	2.1	27.6	29.0	0.8	-0.8	0.6	1.1		
A4	Midtone $L^* = 69$	83.1	3.5	64.7	67.5	1.6	-0.4	4.7	5.4		
B4	Midtone L* = 57	86.5	3.0	53.5	55.9	1.4	-0.2	4.5	5.3		
C4	Midtone $L^* = 45$	98.2	1.5	43.6	45.0	1.1	0.4	5.2	5.4		
D4	Midtone $L^* = 32$	91.8	1.6	33.3	34.2	0.8	-0.4	2.2	2.6		
E4	Shadow $L^* = 20$	92.5	1.4	23.7	24.3	0.8	-0.4	0.2	0.2		
F4	Shadow $L^* = 10$	100.0	1.3	17.7	18.9	0.7	0.3	0.4	0.4		
A5	Midtone $L^* = 55$	91.2	2.3	52.9	54.8	1.4	0.1	5.3	5.7		
B5	Midtone $L^* = 41$	96.8	1.3	40.4	41.4	1.0	0.2	4.3	4.6		
C5	Shadow $L^* = 29$	91.8	1.6	31.4	32.3	0.7	-0.6	1.6	2.0		
D5	Shadow $L^* = 15$	97.1	0.9	21.2	21.7	0.7	-0.1	0.0	-0.1		
E5	Shadow $L^* = 5$	100.0	1.0	16.6	17.6	0.7	0.5	0.6	0.9		
F5	Max Black	100.0	1.0	15.7	16.6	0.8	0.7	1.1	1.5		
Sumr	mary Results	I*Color	I*tone	ΔE		~					
Average So	core for all patches	92.2	93.4	2.0		AA AA	RDENBURG				
	re for the Worst 10% scoring patches)	82.3	90.1	3.6			& Archi	VES	Page 18		



Epson Stylus Pro 9600, Cone Piezotone (custom blend, Portfolio Black, K underprint), Hahnemühle William Turner 310gsm

180 Mlux-hrs Light Exposure (i.e., after) Compared to Original Print Colors (i.e., before)									
		L*			a*		b*		
Column/row	Color Patch	I*Color	ΔE	Before	After	Before	After	Before	After
A1	Media White	100.0	0.9	96.6	97.4	0.4	0.3	1.9	1.5
B1	Highlight L* = 96	99.6	1.3	92.4	93.6	0.7	0.2	2.6	2.3
C1	Highlight L* = 89	94.7	2.2	84.8	86.8	1.0	0.0	3.6	3.6
D1	Highlight L* = 78	87.7	3.2	73.9	76.5	1.5	-0.2	4.6	4.9
E1	Midtone L* = 66	82.8	3.7	61.6	64.6	1.6	-0.4	4.6	5.3
F1	Midtone $L^* = 52$	94.5	2.2	50.0	51.9	1.2	0.3	5.5	5.7
A2	Highlight L* = 92	96.7	1.9	88.3	90.0	0.9	0.1	3.3	3.1
B2	Highlight L* = 85	91.5	2.6	81.0	83.2	1.2	-0.1	4.1	4.1
C2	Highlight L* = 75	86.1	3.4	71.1	74.0	1.5	-0.3	4.7	5.1
D2	Midtone L* = 63	81.8	3.8	58.5	61.6	1.6	-0.5	4.3	5.2
E2	Midtone $L^* = 50$	95.4	2.0	48.6	50.4	1.2	0.3	5.4	5.7
F2	Midtone L* = 38	93.7	1.7	37.4	38.7	0.9	-0.1	3.4	3.9
A3	Highlight L* = 82	89.7	2.9	77.9	80.3	1.4	-0.1	4.3	4.5
B3	Midtone L* = 72	84.5	3.5	67.9	70.7	1.6	-0.3	4.8	5.2
C3	Midtone L* = 60	83.4	3.6	56.3	59.3	1.5	-0.4	4.3	5.2
D3	Midtone L* = 47	97.3	1.5	45.5	46.9	1.1	0.4	5.4	5.6
E3	Midtone L* = 35	92.9	1.7	35.8	37.0	0.8	-0.3	2.9	3.3
F3	Shadow $L^* = 25$	86.9	2.3	27.6	29.2	0.8	-0.9	0.6	1.1
A4	Midtone L* = 69	83.6	3.8	64.7	67.8	1.6	-0.4	4.7	5.3
B4	Midtone $L^* = 57$	86.5	3.2	53.5	56.2	1.4	-0.2	4.5	5.3
C4	Midtone L* = 45	98.4	1.6	43.6	45.1	1.1	0.4	5.2	5.4
D4	Midtone $L^* = 32$	91.5	1.7	33.3	34.5	0.8	-0.5	2.2	2.6
E4	Shadow $L^* = 20$	91.8	1.8	23.7	24.9	0.8	-0.5	0.2	0.2
 F4	Shadow $L^* = 10$	100.0	1.2	17.7	18.9	0.7	0.3	0.4	0.3
A5	Midtone $L^* = 55$	91.2	2.5	52.9	55.0	1.4	0.1	5.3	5.7
B5	Midtone L* = 41	96.5	1.5	40.4	41.6	1.0	0.2	4.3	4.6
C5	Shadow $L^* = 29$	91.2	1.8	31.4	32.5	0.7	-0.6	1.6	2.0
D5	Shadow $L^* = 15$	96.1	1.1	21.2	21.8	0.7	-0.1	0.0	-0.2
E5	Shadow $L^* = 5$	100.0	1.2	16.6	17.8	0.7	0.5	0.6	0.7
<u>F5</u>	Max Black	100.0	1.0	15.7	16.7	0.8	0.7	1.1	1.4
		I*Color	I*tone	ΔE	Aardenburg Imaging & Archives				
Average Score for all patches		92.2	93.3	2.2					
Average Score for the Worst 10% (3 lowest scoring patches)		82.7	90.1	3.8					Page 19





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