



### Comparative Performance Evaluation

**Brand A Ink-Jet Cartridges vs.  
Brand B, Brand C and Brand D Compatible Cartridges**

### Test Objective

Buyers Laboratory Inc. (BLI) was commissioned by Brand A International, Inc. to conduct an independent test of ink-jet cartridge performance in Brand A printers, the purpose of which was to evaluate and compare the page yield, image quality (IQ) and reliability performance of new Brand A #16 (black) and #26 (tri-color) ink cartridges to that of compatible cartridges from Brand B, Brand C and Brand D. Testing was conducted in two phases: In the first, the printers were operated in "Normal" (default) Mode, with two test targets used, one being an ISO black document (see Exhibit A on page 9) with 5% page coverage, and the other being a BLI CMYK (cyan/magenta/yellow/black) document (see Exhibit B on page 9) with 5% coverage for each color. The second test phase was conducted with the printers set in "Best" (or Photo) Mode, with a full-color photographic document as the test target (see Exhibit C on page 9); in this case, only the color cartridges were evaluated. All testing was performed in Buyers Lab's 10,000-square foot test lab located in Hackensack, NJ (USA; www.buyerslab.com).

### Number of Cartridges Tested

	Brand A	Brand B	Brand C	Brand D
Black (#16)	9	9	9	9
Tri-color (#26)	12	12	12	12

### BLI Performance Rankings

	Black Cartridges (#16)				Tri-Color Cartridges (#26)			
	Brand A	Brand B	Brand C	Brand D	Brand A	Brand B	Brand C	Brand D
Overall Page Yield, Normal Mode	4.0	3.8	3.6	1.2	3.9	2.7	4.0	3.1
Image Quality, Normal Mode	3.2	2.7	3.0	1.8	3.0	2.3	2.1	2.4
Image Quality, Best Mode w/ Family Photo*	N/A	N/A	N/A	N/A	3.0	2.7	2.0	1.7
Overall Image Quality	3.2	2.7	3.0	1.8	3.0	2.4	2.1	2.2
Reliability	4.0	3.0	2.9	1.0	4.0	1.0	2.0	1.0
<b>COMPOSITE</b>	<b>3.7</b>	<b>3.2</b>	<b>3.2</b>	<b>1.3</b>	<b>3.6</b>	<b>2.0</b>	<b>2.7</b>	<b>2.1</b>

\* The Family Photo is a full-color photographic test target that was printed on Brand A Premium Photo Paper. See page 9 of this report for a sample image.

Excellent = 4; Good = 3; Fair = 2; Poor = 1

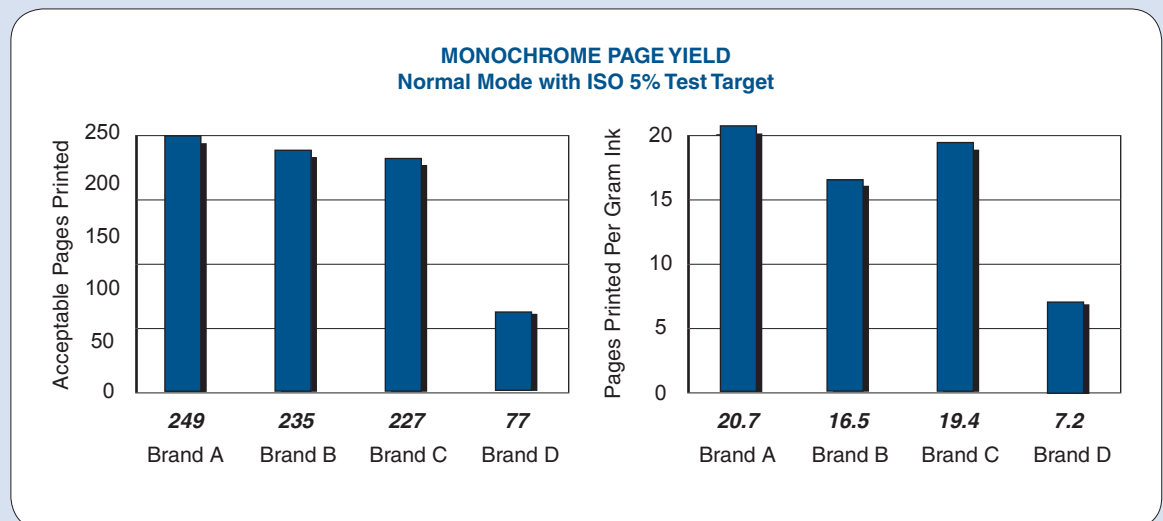
LAB TESTED



## BLI Performance Summary

### Page Yield

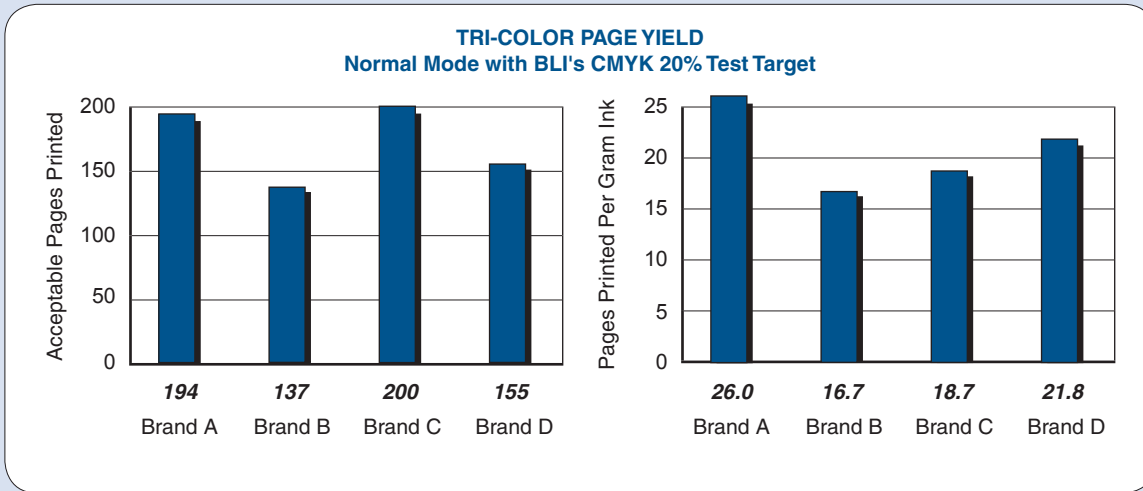
**Monochrome Cartridges (#16), Normal Mode w/ISO 5% Test Target:** With an average of 249 acceptable pages produced, Brand A's black cartridges gave a yield performance that was superior to that of the competitive cartridges tested. Brand B was slightly lower, with an average of 235 pages (including one out-of-box failure), followed by Brand C, with an average of 227 pages (including one out-of-box failure and one premature failure) and Brand D, which yielded an average of only 77 pages (including six out-of-box failures). The Brand A cartridges also surpassed the other cartridge brands in terms of average pages printed per gram of ink, with 20.7 pages per gram, while Brand B yielded 16.5 pages per gram, Brand C 19.4 and Brand D 7.2.



**Tri-Color Cartridges (#26), Normal Mode w/BLI's CMYK 20% Test Target:** Brand C's tri-color cartridges netted the highest page yield when printing BLI's CMYK test target, with an average of 200 acceptable pages (including two out-of-box failures). In contrast, the Brand A cartridges netted an average of 194 pages, while Brand D netted an average of 155 (including one out-of-box failures and three premature failures) and Brand B netted an average of 137 (including three out-of-box failures and one premature failure). However, the Brand C cartridges produced images that were very light and judged to be inferior to the Brand A produced images, while being slightly inferior to those produced by the Brand B and Brand D cartridges. Also noteworthy is the fact that while the Brand C cartridges were filled with an average of 4.0 more grams of ink (53.3%) than the Brand A cartridges, resulting in a marginally higher page count, they only printed 18.7 pages per gram of ink, versus 26.0 for Brand A, while Brand B netted 16.7 pages per gram of ink and Brand D netted 21.8.

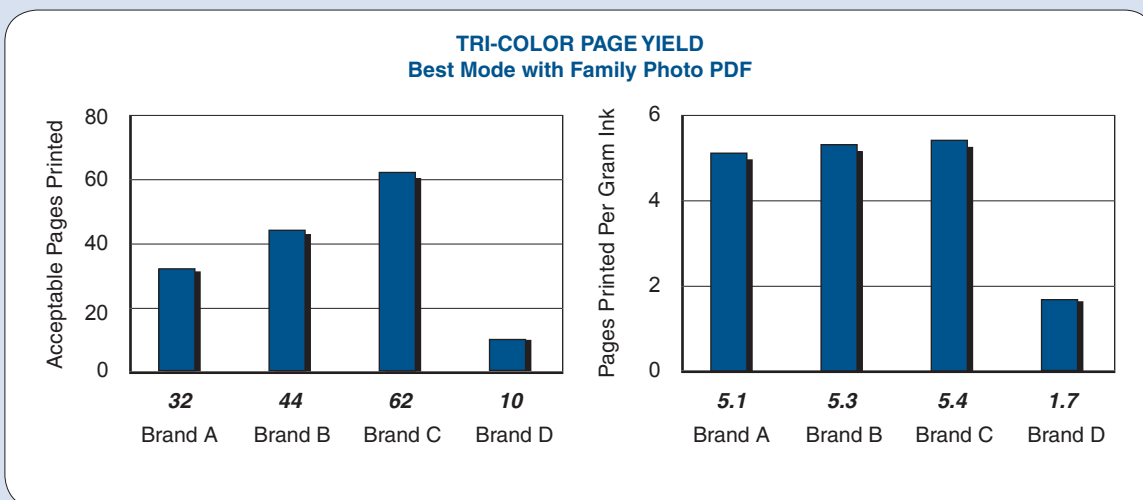
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**Tri-Color Cartridges (#26), Best Mode w/Family Photo PDF:** Brand C's cartridges also netted the highest page yield when printing the full-color "Family Photo pdf" in "Best" Mode, with an average of 62 acceptable pages, whereas the Brand B cartridges netted 44, Brand A 32 and Brand D netted 10 acceptable pages (including two out-of-box failures). However, as with the color test in "Normal" Mode, Brand C's tri-color cartridges produced images that were very light. In fact, BLI's test technicians commented that they had a "washed out" look and were inferior to those produced by the Brand A tri-color cartridges, earning them a color IQ rating of only "Fair" (see samples on page 8). In contrast, the photographic images produced by the Brand A cartridges were clear and uniform and consistently earned "Good" ratings. BLI's test technicians also noted that while Brand B netted a higher average page yield than Brand A, Brand B's tri-color cartridge reliability was rated Poor, as four of the 12 failed, whereas none of the Brand A cartridges failed.

In terms of pages printed per gram of ink, the Brand A, Brand B and Brand C cartridges were all comparable, averaging 5.1, 5.3 and 5.4 pages, respectively. Due to the high number of failures, the Brand D cartridges produced only 1.7 pages per gram of ink.





## Image Quality

**Monochrome Cartridges (#16), Normal Mode w/ISO 5% Test Target:** When printing the ISO 5% test target, the Brand A cartridges produced images that were superior in overall image quality to that of the other brands tested. In fact, three Brand A cartridges achieved a grade of Excellent, five were judged to be Good, one Fair and none Poor, for an average IQ value of 3.2, which translates to an overall grade of Good. Brand C ranked just below Brand A, with four cartridges rated Excellent, two Good, two Fair and one Poor, for grade of 3.0, or Good. One Brand B cartridge was rated Excellent, five Good, two Fair and one Poor, for an average value of 2.7, giving it an overall grade that's borderline Fair/Good. One Brand D cartridge was Excellent, one Good, two Fair and five Poor, for an average IQ value of 1.8 and a grade of borderline Fair/Poor.

**Tri-Color Cartridges (#26), Normal Mode w/BLI's CMYK 20% Test Target:** The disparity in image quality performance between Brand A's tri-color cartridges and that of the competitive cartridges was greater than that observed with the monochrome cartridges. One Brand A tri-color cartridge achieved a rating of Excellent, seven were Good and one was judged to be Fair, giving Brand A an average value of 3.0 and a grade of Good. Brand B had zero Excellents, four Goods, two Fairs and two Pours, for an average value of 2.3 and a grade of Fair overall (one cartridge failed to print). Brand C had zero Excellents, three Goods, four Fairs and two Pours, for an average score of 2.1 and an overall grade of Fair. Brand D, which had zero Excellents, five Goods, three Fairs and one Poor, was also graded Fair, with an average score of 2.4.

**Tri-Color Cartridges (#26), Best Mode w/Family Photo PDF:** In this test, all three of the Brand A cartridges earned a Good rating, while Brand B received two Goods and one Fair; Brand C earned a Fair for each of the three cartridges tested, and Brand D earned a Good for one cartridge and Poor for the other two. The overall grades and average values earned are as follows: Brand A, 3.0 (Good); Brand B, 2.7 (borderline Fair/Good); Brand C 2.0 (Fair); and Brand D, 1.7 (Fair/Poor).

**Tri-Color Cartridges (combined normal and best mode rating):** By taking the weighted averages from both phases of the tri-color testing, combined image quality ratings were obtained and are as follows: Brand A, 3.0 (Good); Brand B, 2.7 (Fair); Brand C, 2.0 (Fair); and Brand D, 1.7 (Fair).

## Reliability

**Monochrome Cartridges (#16):** Throughout testing, the Brand A black ink cartridges gave a reliability performance that was clearly superior to that of the Brand B, Brand C and Brand D cartridges. In fact, while none of the Brand A #16 cartridges failed, Brand B had one black cartridge failure (out-of-box), Brand C had two (one out-of-box failure, and one a premature failure), and Brand D experienced a total of six black cartridge out-of-box failures.

As a result, the overall black cartridge failure rates were as follows: Brand A, 0.0%; Brand B, 11.1%; Brand C, 22.2%; and Brand D 66.7%.

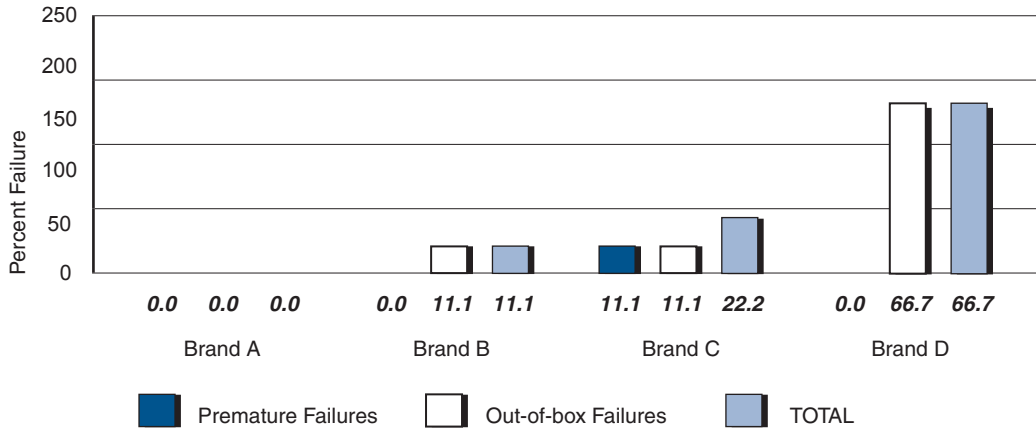
**Tri-Color Cartridges (#26):** As with the black ink cartridges, Brand A's tri-color cartridges displayed reliability performance that was clearly superior to that of the competitive cartridges. Once again, not a single failure was experienced with the Brand A #26 cartridges, whereas

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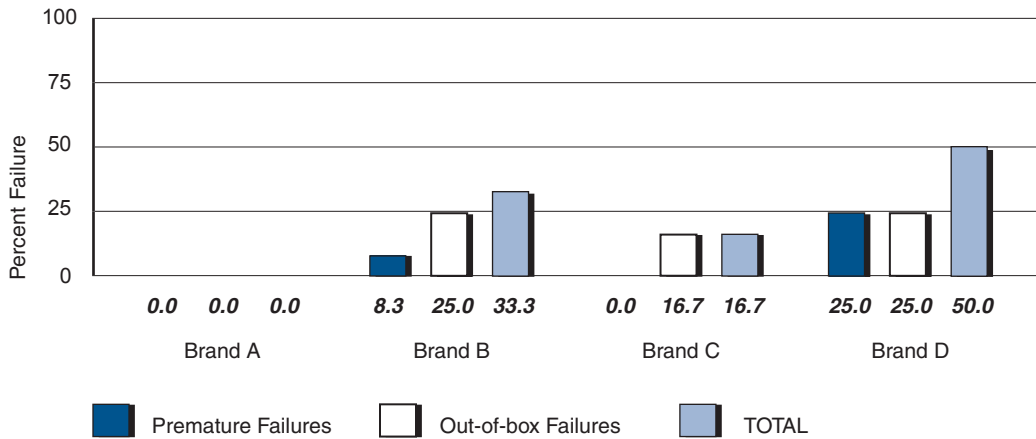
**FAILURE RATE OF BLACK CARTRIDGES**



Brand B had four failures (three out-of-box, with one failing to print at all, and one premature), Brand C had two out-of-box failures, and Brand D had six tri-color cartridge failures (three out-of-box and three premature).

The overall tri-color failure rates were as follows: Brand A 0.0%; Brand B 33.3%; Brand C, 16.7%; and Brand D, 50.0%.

**FAILURE RATE OF TRI-COLOR CARTRIDGES**



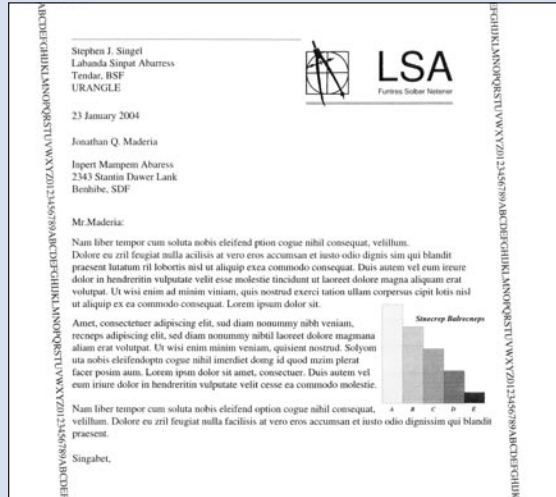


# Brand A Cartridge Performance Evaluation

## BUYERS LABORATORY INC. Test Report

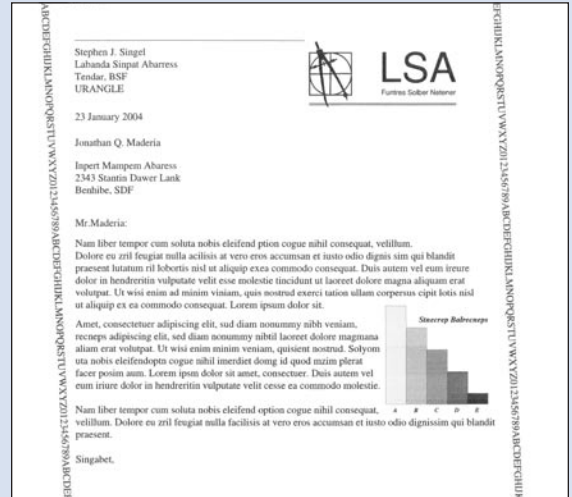
### ISO 5% Text Document Print Samples and Ratings

#### Excellent



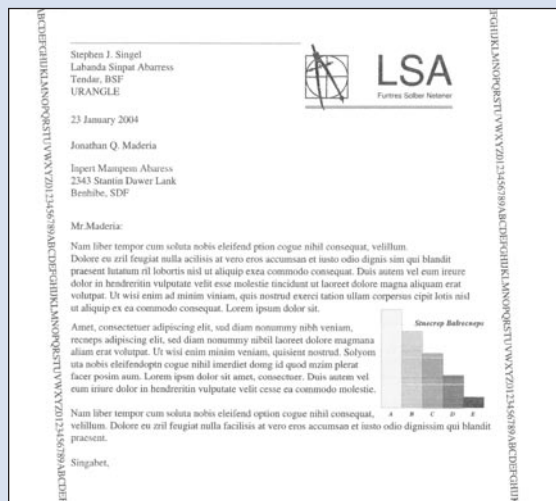
Text is dense, consistent, crisp and clean; Density is very dark and uniform; Bar chart halftone gradations are smooth and clean.

#### Good



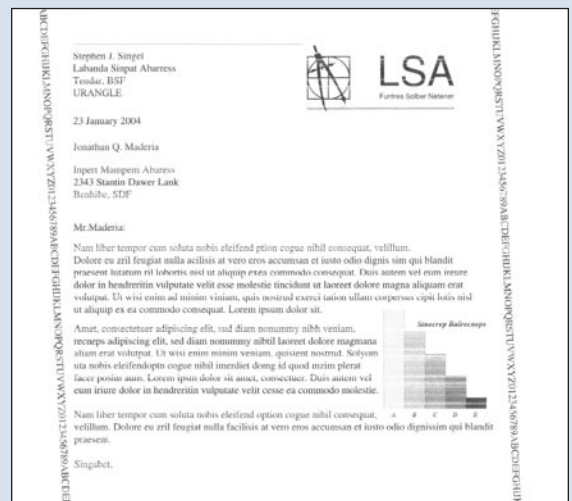
Text is lighter with slight evidence of ink splattering, but still clear; Density is lighter but still uniform; Bar chart halftone gradations are lighter, but still clear.

#### Fair



Text is light with ink splattering and breakup; Density is light with some streaking; Bar chart halftone gradations are evident but very light.

#### Poor

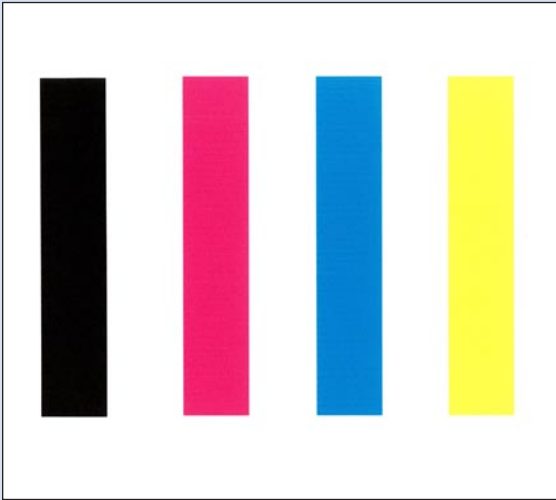


Text is inconsistent, faded and broken; Density is very light with streaking; Bar chart halftone gradations are very light with excessive streaking.



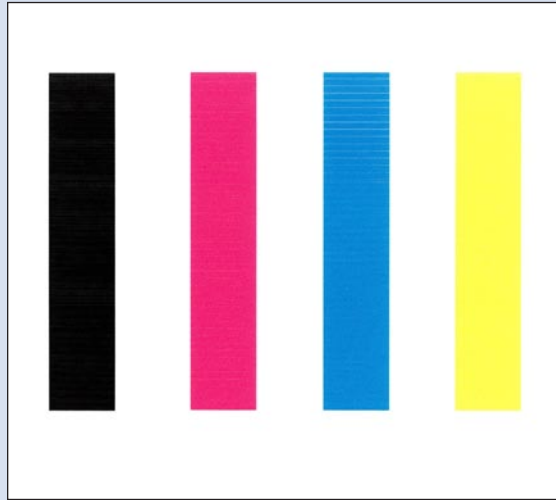
### BLI's 20% Color Test Target Print Samples and Ratings

#### Excellent



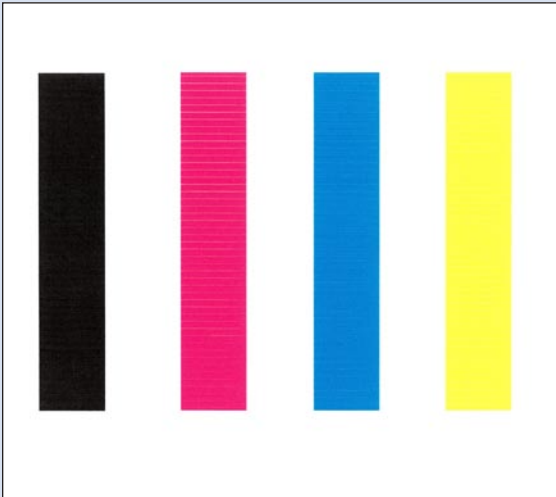
All colors are dense, solid and uniform, with no streaking.

#### Good



Light/intermittent thin-line streaking and/or some loss of color density.

#### Fair



Moderate/consistent thin-line streaking and/or loss of color density.

#### Poor



Excessive thick-line streaking and/or color fade.



## Family Color Photo PDF Samples (details) and Ratings

### Excellent



Images are clean and clearly defined; colors are balanced and strong, and match the original target. Very light graininess.

### Good



Images are clean and clearly defined; colors are balanced, although a shade lighter than the original target. Moderate graininess is also evident.

### Fair



Images are clean and clearly defined, although colors are several shades lighter than the original target, with a somewhat "washed-out" or pale appearance, and are several shades off from the original target. Moderate graininess is also evident.

### Poor



Though images are clear, colors are "washed out" and unbalanced, with over saturation of C, M, Y or K. Color fidelity is poor, with little resemblance to the original target.



### Exhibits

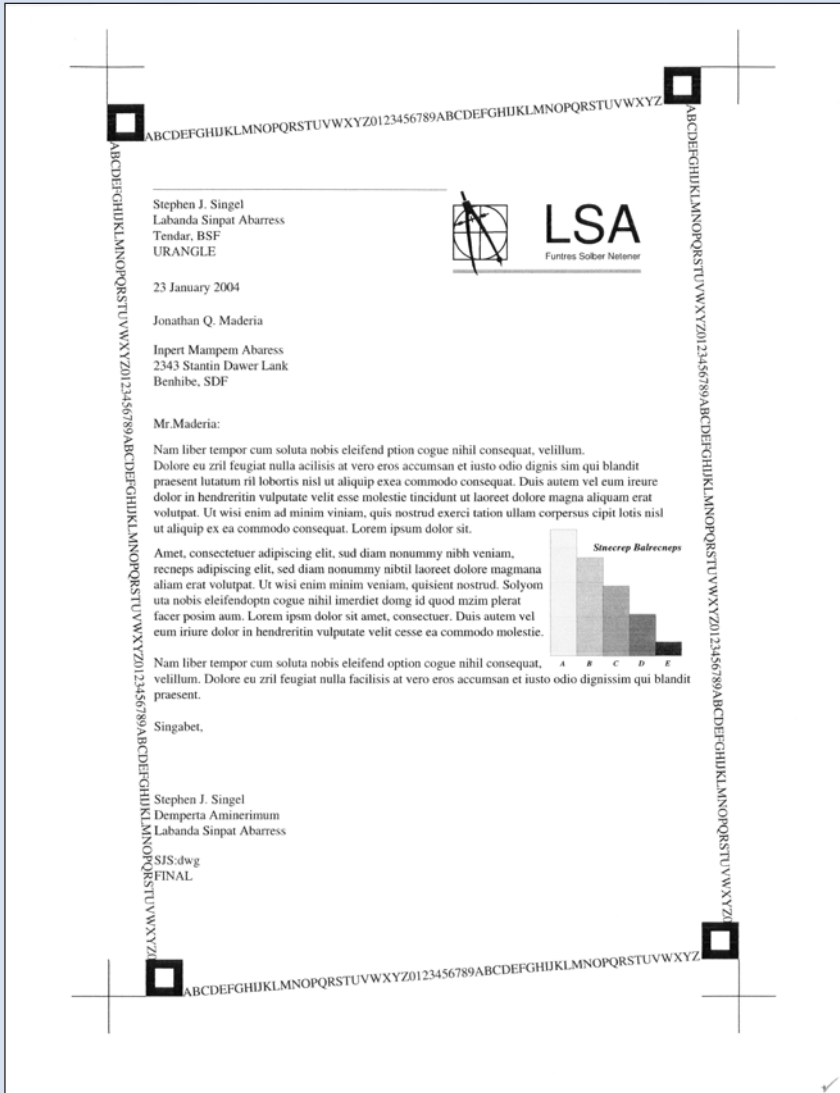


Exhibit A: ISO 5% Test Document

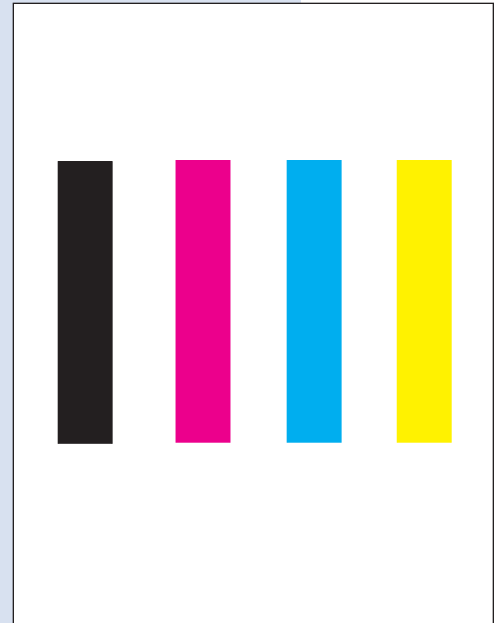


Exhibit B: 20% CMYK Test Document



Exhibit C: Family Photo PDF



# Brand A Cartridge Performance Evaluation

BUYERS LABORATORY INC. Test Report

## Data Tables

### Cartridge-Yield Comparison

Based on "Normal" Mode with ISO and BLI Test Targets  
(Out-of-box Failures Highlighted in Orange)

**Brand B Black**

Cartridge#	Ink Wt.	Pages	Yield
A1	15.8	296	18.7
B1	14.1	270	19.5
C1	13.4	236	18.1
D1	13.6	260	19.3
E1	13.4	240	18.4
F1	15.0	271	18.3
G1	1.9	0	0.0
H1	14.0	245	17.7
I1	16.5	300	18.2
Average	13.1	235	16.5

**Brand B Tri-Color**

Cartridge#	Ink Wt.	Pages	Yield
A1	5.0	131	27.6
B1	0.0	0	0.0
C1	9.5	206	22.3
D1	9.5	238	25.6
E1	9.7	233	25.1
F1	8.3	206	25.3
G1	8.5	0	0.0
H1	9.1	216	24.7
I1	8.4	0	0.0
Average	7.6	137	16.7

**Brand C Black**

Cartridge#	Ink Wt.	Pages	Yield
A2	12.8	263	22.9
B2	13.5	289	21.4
C2	12.5	262	23.4
D2	13.1	265	21.1
E2	13.6	0	0.0
F2	12.7	276	21.9
G2	13.0	272	21.4
H2	13.5	160	22.4
I2	12.8	258	20.5
Average	13.1	227	19.4

**Brand C Tri-Color**

Cartridge#	Ink Wt.	Pages	Yield
A2	12.4	283	23.2
B2	11.9	272	24.2
C2	12.8	165	24.8
D2	11.9	262	22.9
E2	11.3	252	22.8
F2	12.0	268	22.8
G2	9.7	0	0.0
H2	11.1	295	27.3
I2	10.2	0	0.0
Average	11.5	200	18.7

**Brand D Black**

Cartridge#	Ink Wt.	Pages	Yield
A3	1.0	0	0.0
B3	9.2	187	23.2
C3	1.4	0	0.0
D3	0.2	0	0.0
E3	1.0	0	0.0
F3	0.8	0	0.0
G3	11.9	233	20.3
H3	0.8	0	0.0
I3	12.9	269	21.6
Average	4.4	77	7.2

**Brand D Tri-Color**

Cartridge#	Ink Wt.	Pages	Yield
A3	9.2	215	25.3
B3	7.7	165	23.8
C3	4.9	111	25.1
D3	8.4	192	24.2
E3	11.9	295	26.3
F3	5.9	125	23.4
G3	2.5	0	0.0
H3	7.9	176	23.8
I3	5.0	115	24.6
Average	7.0	155	21.8

**Brand A Black**

Cartridge#	Ink Wt.	Pages	Yield
A1	12.2	265	21.7
B1	12.0	231	19.3
C1	12.0	236	19.7
A2	12.1	267	22.1
B2	12.3	264	21.5
C2	11.7	225	19.2
D3	12.0	260	21.7
F3	12.2	257	21.1
G3	11.8	239	20.3
Average	12.0	249	20.7

**Brand A Tri-Color**

Cartridge#	Ink Wt.	Pages	Yield
A1	7.6	196	25.8
B1	7.7	205	26.6
C1	6.2	172	27.7
A2	7.7	202	26.2
B2	7.5	190	25.3
C2	7.7	201	26.1
D3	7.3	190	26.0
F3	7.8	191	24.5
G3	7.8	202	25.9
Average	7.5	194	26.0

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## Cartridge Test Data

Based on "Normal" Mode with ISO and BLI Test Targets  
(Out-of-box Failures Highlighted in Orange)

Printer	Serial#	Run#	Type				Weight			Page Yield			Image Quality	Reason for Termination	
			Brand	Serial#	Lex. Orig.	Color(#)	Start	End	Ink(g)	Sets	SRP	Total			p/g
A	09266339373	1	Brand B	4155MD2GSm	Yes	Bk (16)	32.6	16.8	15.8	293	3	296	18.7	Good	Normal Fade
A	09266339373	1	Brand B	4254MGTX3Sc	Yes	Tri (26)	27.3	22.3	5.0	128	3	131	27.6	Fair	Premature Fade
B	09266339374	1	Brand B	3243M55RFND	Yes	Bk (16)	31.6	17.5	14.1	270	0	270	19.5	Excellent	Normal Fade
B	09266339374	1	Brand B	4200MFD7CQc	Yes	Tri (26)	31.1	31.1	0.0	0	0	0	0.0	N/A	Failed to Print
C	09266341100	1	Brand B	4351MK7WDNA	Yes	Bk (16)	30.3	16.9	13.4	234	2	236	18.1	Fair	Normal Fade
C	09266341100	1	Brand B	4252MGS42Qa	Yes	Tri (26)	32.1	22.6	9.5	204	2	206	22.3	Good	Normal Fade
D	09266340440	1	Brand B	4218MFYB2r	Yes	Bk (16)	31.0	17.4	13.6	257	3	260	19.3	Fair	Normal Fade
D	09266340440	1	Brand B	4182MDTLJPb	Yes	Tri (26)	32.5	23.0	9.5	235	3	238	25.6	Good	Normal Fade
E	09266339371	1	Brand B	3290M65PZt	Yes	Bk (16)	30.7	17.3	13.4	237	3	240	18.4	Good	Normal Fade
E	09266339371	1	Brand B	4029M8GDWPa	Yes	Tri (26)	32.3	22.6	9.7	230	3	233	25.1	Good	Normal Fade
F	09266339365	1	Brand B	5044MLMQ5	Yes	Bk (16)	31.9	16.9	15.0	271	0	271	18.3	Good	Normal Fade
F	09266339365	1	Brand B	4150MCX2ZQc	Yes	Tri (26)	31.2	22.9	8.3	206	0	206	25.3	Good	Normal Fade
G	09266340673	1	Brand B	21920LYVX	Yes	Bk (16)	32.9	31.0	1.9	0	3	0	0.0	Poor	Excessive Streaking at Start
G	09266340673	1	Brand B	3051M1MNJQb	Yes	Tri (26)	31.4	22.9	8.5	0	3	0	0.0	Poor	Excessive Streaking at Start
H	09266340421	1	Brand B	5024LBRW7	Yes	Bk (16)	31.8	17.8	14.0	242	3	245	17.7	Good	Normal Fade
H	09266340421	1	Brand B	2251M8QDSVc	Yes	Tri (26)	32.3	23.2	9.1	213	3	216	24.7	Fair	Normal Fade
I	09266339387	1	Brand B	4128MC94CY	Yes	Bk (16)	32.8	16.3	16.5	297	3	300	18.2	Good	Normal Fade
I	09266339387	1	Brand B	5103MN8B4Qo	Yes	Tri (26)	30.5	22.1	8.4	0	3	0	0.0	Poor	Excessive Streaking at Start
A	09266339373	2	Brand C	5165MNCMS	Yes	Bk (16)	30.1	17.3	12.8	260	3	263	22.9	Good	Normal Fade
A	09266339373	2	Brand C	3206M4C1SPc	Yes	Tri (26)	35.2	22.8	12.4	280	3	283	23.2	Fair	Normal Fade
B	09266339374	2	Brand C	4145MCT1Bs	Yes	Bk (16)	29.8	16.3	13.5	286	3	289	21.4	Excellent	Normal Fade
B	09266339374	2	Brand C	3337M7CFHPb	Yes	Tri (26)	33.9	22.0	11.9	269	3	272	24.2	Fair	Normal Fade
C	09266341100	2	Brand C	4348MK100	Yes	Bk (16)	29.5	17.0	12.5	259	3	262	23.4	Good	Normal Fade
C	09266341100	2	Brand C	4135MCFZJQc	Yes	Tri (26)	35.1	22.3	12.8	162	3	165	24.8	Fair	Normal Fade
D	09266340440	2	Brand C	2231M8D9PLA	Yes	Bk (16)	30.4	17.3	13.1	263	2	265	21.1	Fair	Normal Fade
D	09266340440	2	Brand C	5036MLCFWQc	Yes	Tri (26)	34.5	22.6	11.9	260	2	262	22.9	Good	Normal Fade
E	09266339371	2	Brand C	4343MK564	Yes	Bk (16)	29.7	16.1	13.6	0	3	0	0.0	Poor	Poor Image Quality at Start
E	09266339371	2	Brand C	5041MLM97Ra	Yes	Tri (26)	34.5	23.2	11.3	249	3	252	22.8	Good	Normal Fade
F	09266339365	2	Brand C	4146MCWW2X	Yes	Bk (16)	29.9	17.2	12.7	273	3	276	21.9	Excellent	Normal Fade
F	09266339365	2	Brand C	4173MDM38Qs	Yes	Tri (26)	34.9	22.9	12.0	265	3	268	22.8	Good	Normal Fade
G	09266340673	2	Brand C	5012MKK8K	Yes	Bk (16)	30.2	17.2	13.0	269	3	272	21.4	Excellent	Normal Fade
G	09266340673	2	Brand C	3248M5CGO5c	Yes	Tri (26)	33.8	24.1	9.7	0	3	0	0.0	Poor	Excessive Streaking at Start
H	09266340421	2	Brand C	5118MWR44MB	Yes	Bk (16)	29.6	16.1	13.5	157	3	160	22.4	Fair	Premature Fade
H	09266340421	2	Brand C	4153MCZZQ5b	Yes	Tri (26)	33.6	22.5	11.1	292	3	295	27.3	Fair	Normal Fade
I	09266339387	2	Brand C	4168GFF24	Yes	Bk (16)	30.1	17.3	12.8	255	3	258	20.5	Excellent	Normal Fade
I	09266339387	2	Brand C	4158ML5Tfo	Yes	Tri (26)	33.7	23.5	10.2	0	3	0	0.0	Poor	Excessive Streaking at Start
A	09266339373	3	Brand D	5319MV7Q4JB	Yes	Bk (16)	30.0	29.0	1.0	0	0	0	0.0	Poor	Excessive Streaking at Start
A	09266339373	3	Brand D	5325MVMNCQb	Yes	Tri (26)	32.3	23.1	9.2	212	3	215	25.3	Fair	Normal Fade
B	09266339374	3	Brand D	5328MV804MB	Yes	Bk (16)	28.1	18.9	9.2	184	3	187	23.2	Fair	Normal Fade
B	09266339374	3	Brand D	5325MVHX3Qb	Yes	Tri (26)	30.9	23.2	7.7	162	3	165	23.8	Fair	Normal Fade
C	09266341100	3	Brand D	5319MV5XNNA	Yes	Bk (16)	29.8	28.4	1.4	0	1	0	0.0	Fair	Early Excessive Streaking
C	09266341100	3	Brand D	5325MVHNCQb	Yes	Tri (26)	27.9	23.0	4.9	108	3	111	25.1	Fair	Premature Fade
D	09266340440	3	Brand D	5328MVC6X8B	Yes	Bk (16)	31.5	31.3	0.2	0	0	0	0.0	Poor	Excessive Streaking at Start
D	09266340440	3	Brand D	5325MVHWCQb	Yes	Tri (26)	31.2	22.8	8.4	189	3	192	24.2	Good	Normal Fade
E	09266339371	3	Brand D	5319MV8YT8B	Yes	Bk (16)	30.1	29.1	1.0	0	0	0	0.0	Poor	Excessive Streaking at Start
E	09266339371	3	Brand D	3095M2DPJRC	Yes	Tri (26)	35.7	23.8	11.9	292	3	295	26.3	Good	Normal Fade
F	09266339365	3	Brand D	5319MV8YTOB	Yes	Bk (16)	30.6	29.8	0.8	0	0	0	0.0	Poor	Excessive Streaking at Start
F	09266339365	3	Brand D	5325MVHWCQb	Yes	Tri (26)	29.7	23.8	5.9	122	3	125	23.4	Good	Premature Fade
G	09266340673	3	Brand D	5319MV8PQNA	Yes	Bk (16)	29.8	17.9	11.9	230	3	233	20.3	Excellent	Normal Fade
G	09266340673	3	Brand D	4057M95TLa	Yes	Tri (26)	26.6	24.1	2.5	0	3	0	0.0	Poor	Excessive Streaking at Start
H	09266340421	3	Brand D	3127M32F3s	Yes	Bk (16)	30.4	29.6	0.8	0	3	0	0.0	Poor	Excessive Streaking at Start
H	09266340421	3	Brand D	5325MVHWCQb	Yes	Tri (26)	30.6	22.7	7.9	173	3	176	23.8	Good	Normal Fade
I	09266339387	3	Brand D	5319MV8YTOB	Yes	Bk (16)	30.3	17.4	12.9	266	3	269	21.6	Good	Normal Fade
I	09266339387	3	Brand D	5341WN1CSQb	Yes	Tri (26)	27.8	22.8	5.0	112	3	115	24.6	Good	Premature Fade
A	09266339373	1	Brand A	5319MV8YT08	Yes	Bk(16)	29.6	17.4	12.2	262	3	265	21.7	Good	Normal Fade
A	09266339373	1	Brand A	5325MVHHCQb	Yes	Tri(26)	30.2	22.6	7.6	193	3	196	25.8	Good	Normal Fade
B	09266339374	1	Brand A	5319MV8PQNA	Yes	Bk(16)	29.7	17.7	12.0	228	3	231	19.3	Good	Normal Fade
B	09266339374	1	Brand A	5325MVHHCQb	Yes	Tri(26)	30.2	22.5	7.7	202	3	205	26.6	Good	Normal Fade
C	09266341100	1	Brand A	5319MV8PQNA	Yes	Bk(16)	29.7	17.7	12.0	234	2	236	19.7	Excellent	Normal Fade
C	09266341100	1	Brand A	5325MVHMC8b	Yes	Tri(26)	30.1	23.9	6.2	170	2	172	27.7	Good	Normal Fade
A	09266339373	2	Brand A	5319MV8YT08	Yes	Bk(16)	29.5	17.4	12.1	264	3	267	22.1	Excellent	Normal Fade
A	09266339373	2	Brand A	5325MVHWCQb	Yes	Tri(26)	30.3	22.6	7.7	199	3	202	26.2	Good	Normal Fade
B	09266339374	2	Brand A	5319MV5XNMA	Yes	Bk(16)	29.7	17.4	12.3	261	3	264	21.5	Good	Normal Fade
B	09266339374	2	Brand A	5325MVHWCQb	Yes	Tri(26)	30.2	22.7	7.5	187	3	190	25.3	Good	Normal Fade
C	09266341100	2	Brand A	5319MV0PWNA	Yes	Bk(16)	29.4	17.7	11.7	222	3	225	19.2	Excellent	Normal Fade
C	09266341100	2	Brand A	5325MV4QQb	Yes	Tri(26)	30.2	22.5	7.7	198	3	201	26.1	Good	Normal Fade
D	09266340440	3	Brand A	5319MV8YT08	Yes	Bk(16)	29.5	17.5	12.0	258	2	260	21.7	Fair	Normal Fade
D	09266340440	3	Brand A	5325MVHX3Qb	Yes	Tri(26)	30.2	22.9	7.3	187	3	190	26.0	Fair	Normal Fade
F	09266339365	3	Brand A	5319MV8YTGb	Yes	Bk(16)	29.6	17.4	12.2	254	3	257	21.1	Good	Normal Fade
F	09266339365	3	Brand A	5325MVHWCQb	Yes	Tri(26)	30.2	22.4	7.8	188	3	191	24.5	Good	Normal Fade
G	09266340673	3	Brand A	5319MV7Q4JB	Yes	Bk(16)	29.3	17.5	11.8	239	0	239	20.3	Good	Normal Fade
G	09266340673	3	Brand A	5325MVJ4QQb	Yes	Tri(26)	30.2	22.4	7.8	202	0	202	25.9	Excellent	Normal Fade



# Brand A Cartridge Performance Evaluation

BUYERS LABORATORY INC. Test Report

## Tri-Color Cartridge Page-Yield Comparison Based on "Best" Mode with Family Photo PDF (Out-of-box Failures Highlighted in Orange)

Brand A			
Cartridge#	Ink Wt.	Pages	Yield
J1	5.5	26	5.3
K1	7.1	33	4.8
K2	7.2	36	5.3
<b>Average</b>	6.6	32	5.1

Brand C			
Cartridge#	Ink Wt.	Pages	Yield
K5	12.0	66	5.7
J6	12.4	63	5.2
K6	11.6	57	5.2
<b>Average</b>	12.0	62	5.4

Brand B			
Cartridge#	Ink Wt.	Pages	Yield
J4	8.5	42	5.3
K4	10.2	48	5.4
J5	8.6	41	5.2
<b>Average</b>	9.1	44	5.3

Brand D			
Cartridge#	Ink Wt.	Pages	Yield
J7	6.7	31	5.1
K7	3.6	0	0.0
K8	3.1	0	0.0
<b>Average</b>	4.5	10	1.7

## Tri-Color Cartridge Test Data Based on "Best" Mode with Family Photo PDF (Out-of-box Failures Highlighted in Orange)

Printer	Serial#	Run#	CARTRIDGE											Image Quality	Reason for Termination
			Type				Weight			Page Yield					
			Brand	Serial#	Lex.Orig.	Color(#)	Start	End	Ink(g)	Sets	SRP	Total	p/g		
J	09266339363	4	Brand B	4203MGKCR0d	Yes	Tri(20)	30.6	22.1	8.5	42	0	42	5.3	Fair	Normal Fade
K	10426886106	4	Brand B	2307M05XSRd	Yes	Tri(20)	31.2	21.0	10.2	48	0	48	5.4	Good	Image Quality Deterioration
J	09266339363	5	Brand B	4172MDG14Rc	Yes	Tri(20)	30.6	22.0	8.6	41	0	41	5.2	Good	Image Quality Deterioration
<b>Average</b>			<b>Brand B</b>				<b>9.1</b>			<b>44</b>				<b>5.3</b>	<b>Good/2.7</b>
K	10426886106	5	Brand C	3255M5CR1Pb	Yes	Tri(20)	35.2	23.2	12.0	66	0	66	5.7	Fair	Normal Fade
J	09266339363	6	Brand C	4017M578XPc	Yes	Tri(20)	36.0	23.6	12.4	63	0	63	5.2	Fair	Normal Fade
K	10426886106	6	Brand C	4165MD6X2Rc	Yes	Tri(20)	34.8	23.2	11.6	57	0	57	5.2	Fair	Normal Fade
<b>Average</b>			<b>Brand C</b>				<b>12.0</b>			<b>62</b>				<b>5.4</b>	<b>Fair/2.0</b>
J	09266339363	7	Brand D	5325MVMWCQb	Yes	Tri(20)	28.4	21.7	6.7	31	0	31	5.1	Good	Normal Fade
K	10426886106	7	Brand D	5325MVBHWCQb	Yes	Tri(20)	29.6	26.0	3.6	0	3	0	0.0	Poor	Poor Initial Quality
K	10426886106	8	Brand D	5325MVBHTKpb	Yes	Tri(20)	30.2	27.1	3.1	0	3	0	0.0	Poor	Poor Initial Quality
<b>Average</b>			<b>Brand D</b>				<b>10</b>			<b>10</b>				<b>1.7</b>	<b>Fair/1.7</b>
J	09266339363	1	Brand A	5325MVJ4QQb	Yes	Tri(20)	30.1	24.6	5.5	28	0	28	5.3	Good	Normal Fade
J	09266339363	2	Brand A	5325MVBVRSb	Yes	Tri(20)	30.3	23.1	7.2	36	0	36	5.3	Good	Normal Fade
K	10426886106	1	Brand A	5325MVNX30b	Yes	Tri(20)	30.1	23.0	7.1	33	0	33	4.8	Good	Normal Fade
<b>Average</b>			<b>Brand A</b>				<b>6.6</b>			<b>32</b>				<b>5.1</b>	<b>Good/3.0</b>



### Test Methodology Overview

#### Conditions

BLI performed these tests under controlled conditions of temperature and humidity, with conditions monitored 24/7 by a Honeywell Model 61 Seven-Day Temperature/Humidity Chart Recorder. The allowable temperature range was 68°F to 78°F, and the allowable humidity range was 35% to 65%. All test devices and materials were conditioned for a minimum of eight hours prior to testing.

#### Page Yield

**A) Monochrome (#16) / Tri-Color (#26) Cartridges, Normal Mode:** In the first phase of testing, the printers were run in "Normal" (default) Mode using standard bond paper. Nine sets of cartridges from each manufacturer were tested in nine Brand A ink-jet printers (labeled A through I), with each cartridge set consisting of one black (#16) and one tri-color cartridge (#26). As the Brand A results were taken from an earlier study, a total of 27 cartridge sets were evaluated during this test run, with nine sets running concurrently, requiring a total of three runs, with all of the cartridge sets of a particular brand run simultaneously. The test suite used consisted of two documents: an ISO black document with 5% coverage, and a BLI 20% CMYK color target comprised of four vertical bars (5% cyan, 5% magenta, 5% yellow, 5% black coverage). Five copies of the ISO target were initially printed, followed by 75 copies of the four-color target, in sets of five to 15 pages, and this protocol was continued until both cartridges either failed or reached end of life.

As is typical with ink-jet printers, some of the cartridges exhibited horizontal streaks on the test pages, in varying degrees. When this condition occurred, a streak removal process was initiated, in which a single "Streak Removal Page" (SRP) was printed in an attempt to clean the cartridge nozzles, and thus eliminate the streaks. When streaking occurred, the printer was "rested" for five minutes, and five more pages were printed. If the streaking persisted, the streak removal process was restarted. Because this procedure results in a significant expenditure of ink (thereby affecting yield), the number of times an SRP could be performed was limited to three per cartridge set. When calculating yields, each SRP was counted as one page. Excessive streaking after the third SRP constituted a cause for failing a cartridge.

The total page count per black (#16) cartridge was defined as the number of acceptable pages printed (that is, pages without image quality defects, such as excessive streaking, textual imperfections or fading), plus the number of SRPs printed. The overall average black page yield per brand was defined as the combined total number of acceptable pages printed by all of the cartridges, divided by nine. The average pages per gram of ink was defined as the page count divided by the grams of ink consumed, which was determined by weighing the cartridge before and after the test. The total page count for a tri-color (#26) cartridge was defined as the number of acceptable pages printed, plus the number of SRPs, minus the number of ISO black documents printed. The overall average tri-color page yield per brand was defined as the combined total number of acceptable pages printed by all of the cartridges, divided by nine.



**B) Tri-Color (#26) Cartridges, Best Mode:** For each brand, one black/tri-color cartridge set was run in each printer and tested for page yield, for a total of three cartridge sets run in two printers. Each printer was operated in "Best" (Photo) Mode with Brand A Premium Photo Paper, and a "family photo pdf" test target (which consists of three 4 x 6 photographic images on one page) was used. The "family photo pdf" was printed until the first sign of image quality degradation (such as streaking, voids, blotches, uneven tones, fading, etc.) was observed, at which point end of life was declared. The overall average tri-color page yield per brand was defined as the combined total number of acceptable pages printed by all cartridges, divided by three. The average pages per gram of ink was defined as the page count divided by the grams of ink consumed, which was determined by weighing the cartridge before and after the test.

### Image Quality

**A) Monochrome (#16) / Tri-Color (#26) Cartridges, Normal Model:** In this phase of testing, black image quality was based on output of the ISO target, which was visually assessed by a team of BLI laboratory test technicians and assigned a grade of Excellent, Good, Fair or Poor, for which a corresponding numerical value was also assigned (Excellent = 4; Good = 3; Fair = 2; and Poor = 1). Averages of the individual cartridge grades were calculated in order to assign a value and overall grade to each brand of cartridge. BLI's test analysts based their assessments on a set of specific criteria, including imperfections in lettering, solids and lines, density, and the appearance of streaks. Color image quality in this phase was based on BLI's four-color vertical bar test document, with the analysts using a set of criteria that included the occurrence of streaking (width and frequency of streak lines), color density, uniformity and color fidelity.

**B) Tri-Color (#26) Cartridges, Best Mode:** In this test phase, the printers were run in "Best" (Photo) Mode. The test target was a full-color "family photo pdf" consisting of a grouping of three identical photographic images, which were printed on Brand A Premium Photo Paper. Three tri-color cartridges of each brand were tested on two printers (labeled J and K), for a total of 12 cartridges tested (including Brand A). Black cartridges from the same manufacturer were run with each tri-color cartridge tested, in order to balance the images produced and thereby to facilitate the evaluation process. The tri-color cartridges tested in "Best" Mode were evaluated based on criteria that included image graininess, clarity/sharpness, color fidelity and density.

### Reliability

Throughout testing, any cartridge malfunctions observed, such as operational/mechanical failure, physical defects, ink leakage, clogged print-head nozzles, and image quality failures, were recorded. BLI's test technicians also compared unpackaged products to Brand A original samples and/or images to validate authenticity.

**Out-of-box failures:** A cartridge that was inoperable upon installation, or produced 20 or fewer acceptable pages, was considered to be an "out-of-box" failure.

**Premature failures:** Cartridges that produced below 75% of the average Brand A page yield were considered to be premature failures.