



IT Test Lab

Resolution Computer Supplies Technical Evaluation of Inkjet Cartridges

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Table of Contents

Resolution Computer Supplies	1
Service.....	1
Cartridge Life.....	3
Ink Level Detection.....	3
A4 Page 5% Black Coverage.....	3
Canon i850.....	3
Epson Stylus Photo 1290	3
A4 Page 100% CMY Coverage	4
Canon i850.....	4
Epson 1290.....	4
A4 Photo Test	4
Canon i850.....	4
Epson 1290.....	4
Print Quality.....	5
Black Coverage Test.....	5
Complex Photo Test.....	5
Canon i850.....	5
Epson 1290.....	5
Paper Quality	6
Results Tables	7
Black Ink Life @ 5% Coverage.....	7
Cyan, Magenta & Yellow @ 100% Coverage.....	9
A4 Photo @ 100% Coverage.....	10
Charts	11
Canon i850 Black A4 Page Life at 5% Coverage.....	11
Epson 1290 Black A4 Page Life at 5% Coverage	12
Canon i850 CMY Test Results - All Colours	13
Canon i850 CMY Test Results - Cyan	14
Canon i850 CMY Test Results - Magenta.....	15
Canon i850 CMY Test Results - Yellow	16
Epson 1290 CMY Test Results.....	17
Canon i850 Page Life - Photo Image.....	18
Epson 1290 Page Life - Photo Image	19
Paper Quality	20
Canon i850.....	20
Epson 1290.....	21
HP 7550	21
Appendix.....	22
Cartridge Ink Fill Levels.....	22
Black	22
Cyan	22
Magenta.....	23
Yellow.....	23

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Service

The Lab will be carrying out four distinct rounds of testing on each set of cartridges.

- 1 5% A4 black coverage test.
This test is repeated at least 3 times and will require at least three black ink cartridges (and if the printer mixes colour ink with black it will also require a single colour cartridge as well). Each of the black cartridges should preferably be from different batches (allowing us to also investigate batch consistency). The test is not used to determine quality other than coverage and saturation.
This test determines the life of the black cartridge in terms of an average %5 coverage black text document.

- 2 CMY colour test.
This test involves an image that is 30% each of pure Cyan, Magenta and Yellow covering an entire A4 page. The test is not used to determine quality other than coverage and saturation.
Again the test will be repeated a minimum of three times, thus requiring at least three colour cartridges or cartridge sets, preferably from different batches. Note that if the printer has individual ink tanks then two of each is colour required *for each test* as different printers mix the inks in varying ways resulting in some ink tanks being exhausted well before others
This test determines the life of the colour cartridge/s producing a 100% coverage A4 page.

- 3 Colour Photo Test
In this test a full A4 colour photo is used to test the life of the colour cartridges under test. It is more representative of a “typical” photo that a home user is likely to print out and has been carefully chosen by the Lab to ensure it has a reasonably good balance of colour and universal subject appeal.



This test is run to provide the client with a result that can be used in marketing material and simply understood by the public. The CMY test is too contrived and artificial for public consumption. This test is only carried out once, but the results are crosschecked using the CMY and Web Page

tests. If the printer has a single colour ink cartridge only a single colour cartridge is required. However if the printer has individual ink tanks, two of each colour is required as different printers mix the inks in varying ways resulting in some ink tanks being exhausted well before others. This test is used to determine the overall colour balance of the cartridge and to a minor extent the detail.

4 Complex Photo Test

This is not a life test, it is simply performed so the Lab staff can assess the cartridges colour balance and detail in depth. As a result we can generally “re-use” any cartridges from the previous series of tests that are not completely depleted.



Cartridge Life

It is important to note that in the case of the Canon i850 printer the test results for the OEM cartridges is based on historic results garnered over quite a long time period. And, these results were based on number of pages produced up until the Printer Driver Software halted printing stating that the cartridges were empty. The cartridges were not run until “dry” i.e. page-printing faults occurred because of lack of ink. In the case of the non-genuine cartridges there was either no software notification or it was very unreliable, as a consequence the non-genuine cartridges were tested to “dry”. If a software warning was given this was duly noted.

Ink Level Detection

This seems to be a hit and miss affair with both the G&G and Armor cartridges with regards to the Canon i850 printer. Occasionally the Canon software determines that the cartridge is approaching empty and at other times is completely oblivious to the fact that the ink has run out entirely.

The Resolution brand ink cartridges are a different matter with software notification of low ink always occurring before the ink physically ran out. And, like Canon’s own detection system the software notification occurs well before the cartridge is actually exhausted ranging from 12% more pages to 50% more pages until the ink physically runs out.

A4 Page 5% Black Coverage

Canon i850

The OEM cartridges have a very good page life at 450 pages of 5% coverage, particularly when you realise this is only until software “ink out” notification and not true ink out.

Of the Armor cartridges only one of the three signalled software ink out, and this was at a very low 240 pages. This is a very misleading result as the cartridge continued to print until at 496 pages the ink ran dry.

The G&G has no software notification but ran dry at 444 pages, which is coincidentally when the Resolution brand cartridge ran dry. The Resolution brand provided software ink out notification at the 367-page mark.

Epson Stylus Photo 1290

The Epson had a print head failure and by the time repairs were completed the Resolution advised us not to test the Armor product any further, as a consequence there are no results for this product.

The OEM cartridges produced 530 pages before software notification that the cartridge was empty and must be replaced. Unlike the Canon printer cartridges the Epson ink cartridges have a small IC that counts the ink pulses and once the IC indicates the cartridge is empty it must be replaced with another cartridge or the printer will not print any further.

The G&G cartridge produced a lower page count of 460 pages although the results were very consistent across the three cartridges tested.

The Resolution brand cartridges produced the lowest number of pages, 390 and with a surprisingly large variation between the cartridges given the printers method of calculating the cartridges ink content.

It may be worth investigating whether the Resolution vendor can manufacture the Epson cartridge with a higher ink charge to bring it more in line with the OEM cartridge.

A4 Page 100% CMY Coverage

Canon i850

The Armor cartridges produced higher page yields than the G&G or Resolution brands, at times by a significant amount. The Resolution brand produced slightly lower page yields for each of the CMY cartridges than the G&G brand.

Epson 1290

We were concerned that the G&G cartridges were running out of ink before the software warning, typically we produced full colour A4 pages before the output began to deteriorate because the ink was running out. However we continued to run the test, with poor quality output, until the software “replace cartridge” warning occurred at typically 38 pages.

With the Armor cartridge the software “replace cartridge” warning occurred consistently at 36 pages.

As with the black page test the software “replace cartridge” warning for the Resolution brand did not occur at consistent page life, although the Resolution brand cartridges did produce the highest page count of the brands tested with an average of 39 pages.

A4 Photo Test

Canon i850

The Canon printer had developed a print head fault during testing and while under repair Resolution requested that we discontinue testing of the Armor brand and as a consequence it is not included in this test.

The OEM had the lowest page count for each of the CMY cartridges tested while the G&G produced the most pages per cartridge in this test. The Resolution brand cartridge was midway between the OEM and G&G in terms of page life.

Epson 1290

It was interesting to note that in common with the Canon test the OEM cartridge produced the lowest page life while the Resolution brand cartridge produced significantly high page yields than all the other brands. The G&C and Armor had page yields in between the OEM and Resolution brand.

Print Quality

Black Coverage Test

There is no doubt that the Armor Black ink is the best in terms of richness, even when compared to the OEM ink. The Armor black is very dark in colour and its coverage of plain paper superior to the OEM and G&G products. The Resolution brand ink is not quite as rich as the OEM and Armor but is slightly superior to the G&G, although the Resolution brand does not leave as noticeable paper fibre artefacts.

The G&G black ink is definitely the worst of the three, it is quite simply too pale and has relatively poor coverage of the paper with fibre features clearly visible through the ink coating.

Complex Photo Test

Canon i850

From a consumer point of view the OEM ink produced the most “pleasing” output on photo glossy paper, the colour while rich were not too “overblown”, contrast was good and greyscales the best of the inks tested.

The Armor ink was the closest match to the OEM ink, again colours vivid but not overblown and good contrast; however greyscales had a definite green cast.

The Resolution brand inks were not as vivid as the OEM or Armor inks but then again the colours appeared to be more realistic, particularly skin tones. Contrast was still very good and while the greyscale output was not incorrectly coloured it was slightly “washed out” when compared to the OEM ink.

The G&G inks in general produced a good result, colours were slightly more vivid than the Resolution brand, arguably at the expense of colour realism, and the contrast was not quite as good.

We should note that in isolation the average consumer would be very satisfied with the output using any of the inks tested it is only, and we must stress this point, only when the various outputs are compared side by side that the differences become apparent.

Epson 1290

Quality testing was only carried out using OEM and Resolution Brand inks.

We should also note that the Epson OEM ink output, even when printed on the manufacturers own “Premium Glossy” paper was inferior to any of the inks used in the Canon tests. The OEM ink output was too dark with relatively low contrast, although the colours were very rich.

The Resolution ink output was slightly darker and with arguably lower contrast, and while the colours were generally quite realistic the blues in particular were more realistic than the OEM ink.

Of the two inks the output of the OEM ink was generally preferred to the Resolution ink when assessed by the relatively small sample of Lab staff but the difference between the two was quite small.

Paper Quality

Although not a part of the original brief the Lab was supplied with a wide range of Glossy inkjet papers, from various vendors, which included product from Resolution. The OEM vendors' papers include their "standard" glossy photo paper and their Pro or Premium glossy paper.

The full list of the paper types and general observations can be found in the "Paper Quality" tables.

In general we found the Resolution brand glossy paper to be in general superior to the OEM vendors' entry-level glossy paper and on par, and at times surpassing, the OEM premium gloss range of papers.

Results Tables

Black Ink Life @ 5% Coverage

Canon i850

	OEM to S/W Notification	G&G to Dry	Armor to S/W notification	Armor to Dry	Resolution to S/W notification	Resolution to Dry
Run 1	22.5	21.886	12	25.744	19	22.35
Run 2	N/A	21.841	N/A	24.747	17	20.178
Run 3	N/A	22.934	N/A	23.913	19	24
Average	22.5	22.220	12.000	24.801	18.333	22.176
Calc Average 5% coverage	450	444.407	240.000	496.027	366.667	443.520

Epson 1290

	OEM to S/W Notification	G&G to S/W notification	Resolution to S/W notification
Run 1	27	23	failed
Run 2	26	23	22
Run 3	Failed	23	17
Average	26.5	23.000	19.500
Calc 5% coverage	530	460.000	390.000

Notes:

- 1 Canon OEM test results are based on the average of many past tests hence the single result in the table.
- 2 There is no available historical data on the cartridge life to "dry" for the Canon i850, only to software notification.
- 3 The Canon Armor cartridges on rare occasions produce printer driver software ink level warning but these are extremely unreliable and quite rare in their occurrence.
- 4 The G&G cartridges did not provide any printer driver software ink level warning for the Canon printer.

- 5 The “failed” tests on the Epson printer were the result of a printer fault in the case of the OEM test and a faulty cartridge in the case of the Resolution cartridge test.

Cyan, Magenta & Yellow @ 100% Coverage**Canon i850**

	G&C C	G&C M	G&C Y	Armor C (DRY)	Armor M (Dry)	Armor Y (DRY)	Resolution C (Dry)	Resolution M (Dry)	Resolution Y (Dry)
Run 1	199	120	144	200	125	154	178	114	128
Run 2	214	107	138	231	118	215	191	109	132
Run 3	222	108	147	215	117	220	181	113	134
Calc Highest	222.000	120.000	147.000	231.000	125.000	220.000	191.000	114.000	134.000
Calc Lowest	199.000	107.000	138.000	200.000	117.000	154.000	178.000	109.000	128.000
Average	211.667	113.500	143.000	215.333	120.000	196.333	183.333	112.000	131.333

Epson 1290

	G&C PentColour (S/W)	G&C PentColour (DRY)	Armor PentColour (S/W)	Resolution PentColour (S/W)
Run 1	39	37	36	42
Run 2	38	37	N/A	38
Run 3	38	33	N/A	38
Calc Highest	39.000	37.000	36.000	42.000
Calc Lowest	38.000	33.000	36.000	38.000
Average	38.333	35.667	36.000	39.333

Notes

- 1 There are no OEM ink comparisons, as the Lab has not carried out CMY tests on these two printers in the past.
- 2 After the first test run of the Armor cartridge in the Epson printer the print heads became faulty, we believe the Armor ink was not the cause of this failure. Once the printer was repaired the Lab was directed by the client to discontinue testing of the Armor product, hence just the single result.

A4 Photo @ 100% Coverage**Canon i850**

Individual C, M, Y	OEM C (to S/W warning)	OEM M (to S/W warning)	OEM Y (to S/W warning)	G&C C (to Dry)	G&C M (to Dry)	G&C Y (to Dry)	Resolution C (to Dry)	Resolution M (to Dry)	Resolution Y (to Dry)
Photo Pages	85	69	65	127	89	89	108	89	79

Epson 1290

PentColour Cartridge	OEM	G&C	Armor	Resolution
Photo Pages	27	30	31	38

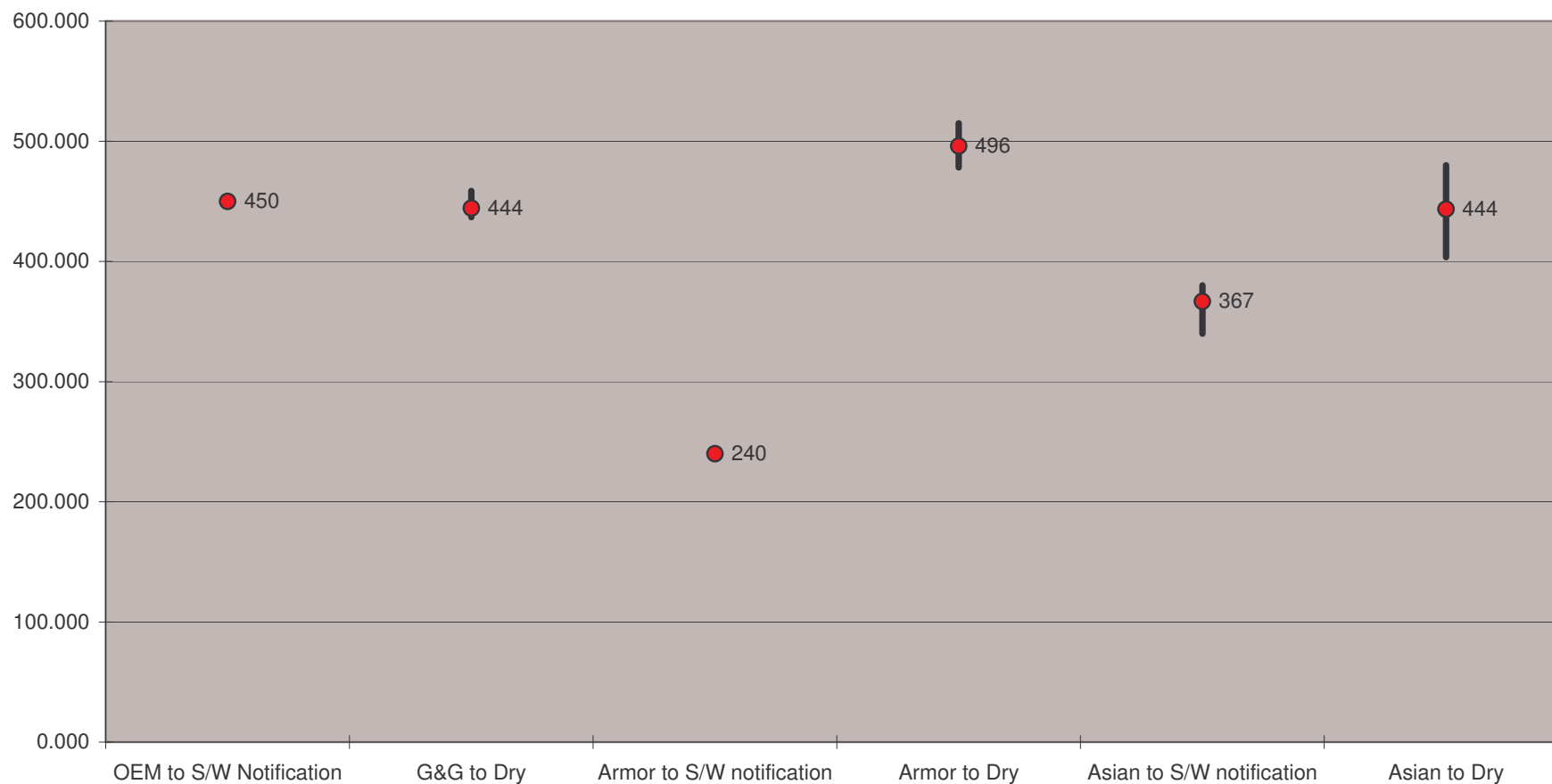
Notes:

- 1 Canon OEM cartridge results are based on historical data and the testing only up to the printer driver software ink level warning. As a consequence the page life may be lower than it would be if the cartridges were run until they were dry.

Charts

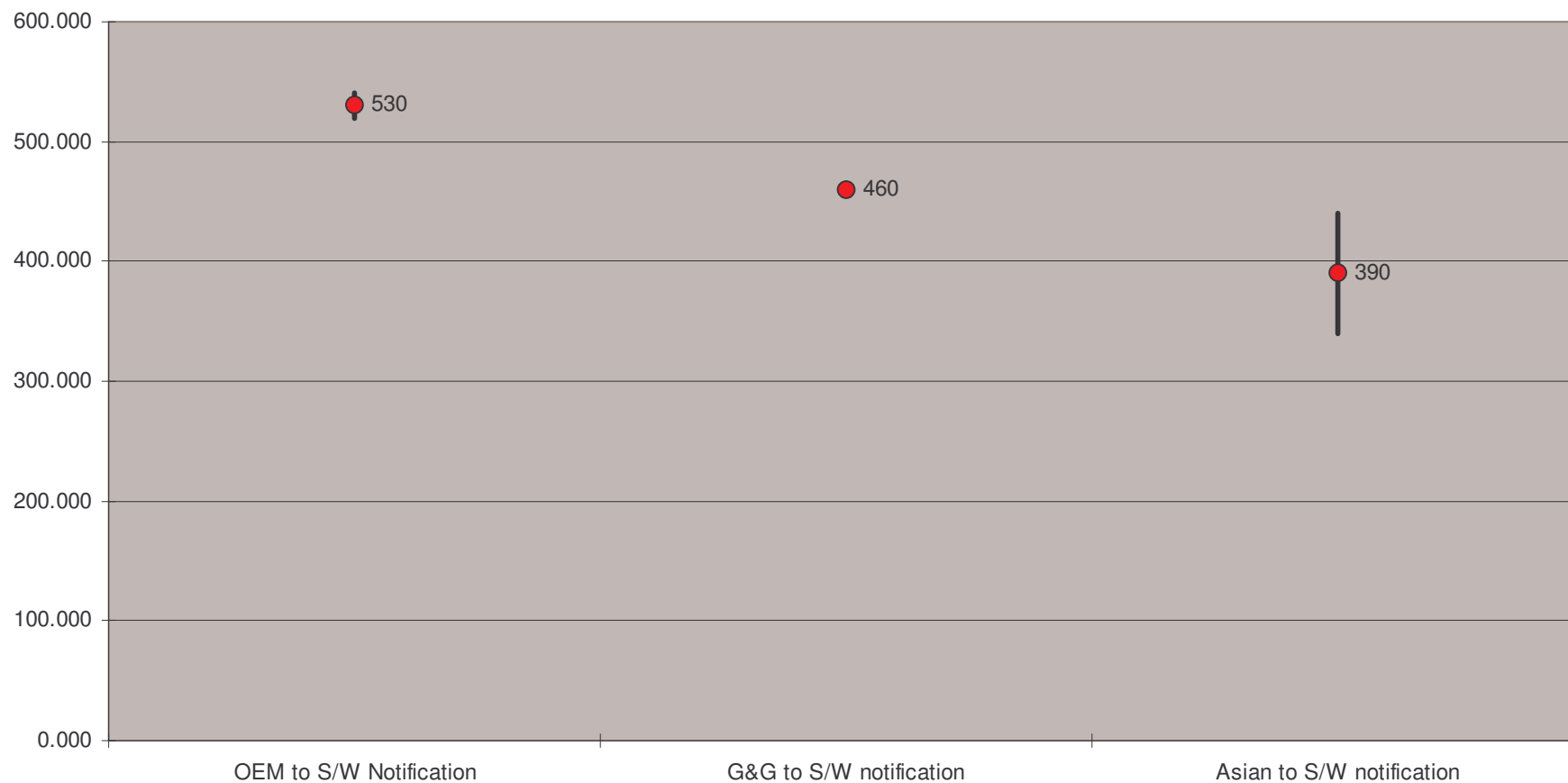
Canon i850 Black A4 Page Life at 5% Coverage

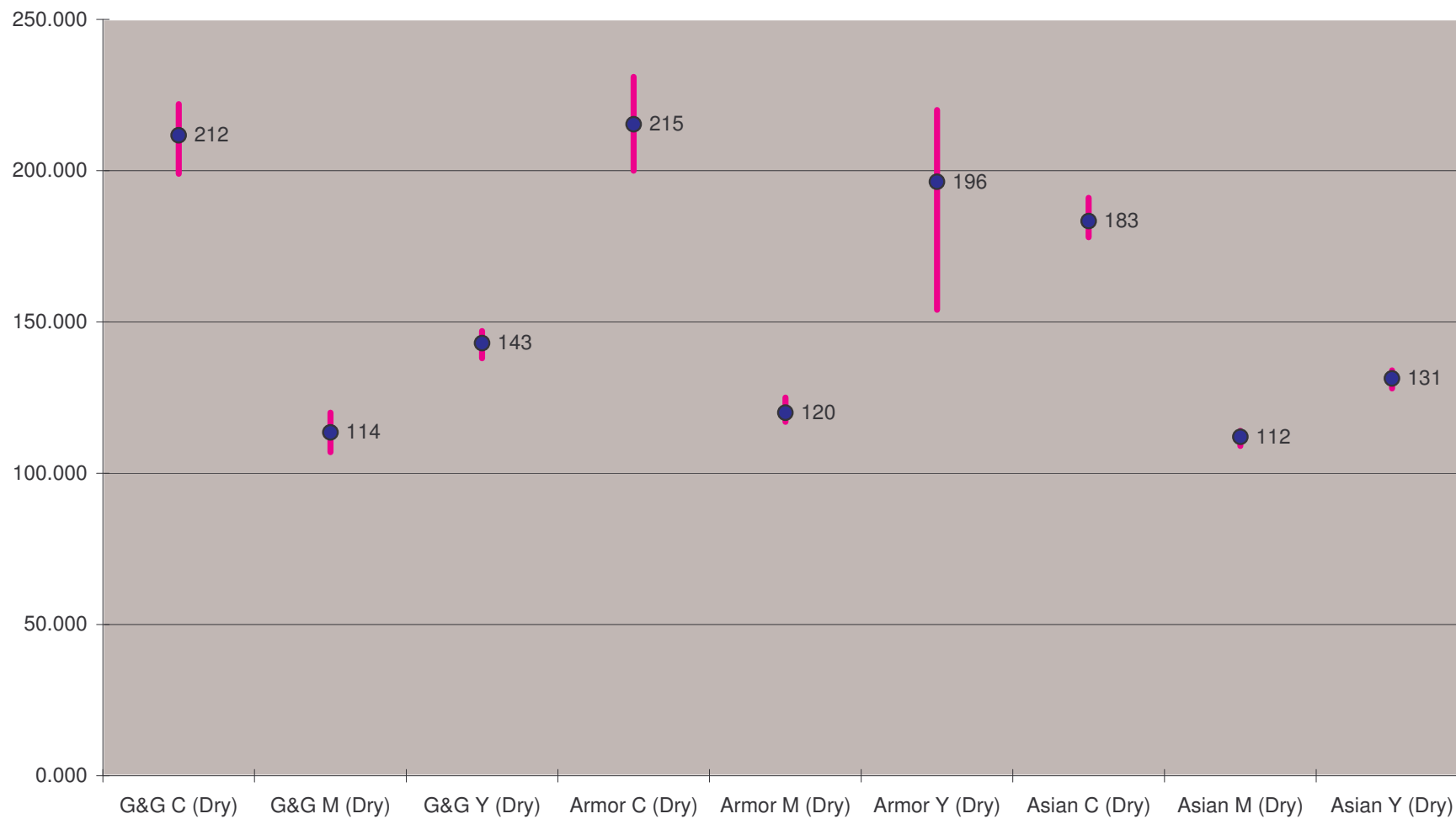
Canon i850 Black A4 Page Life at 5% Coverage
(Higher scores are better)



Epson 1290 Black A4 Page Life at 5% Coverage

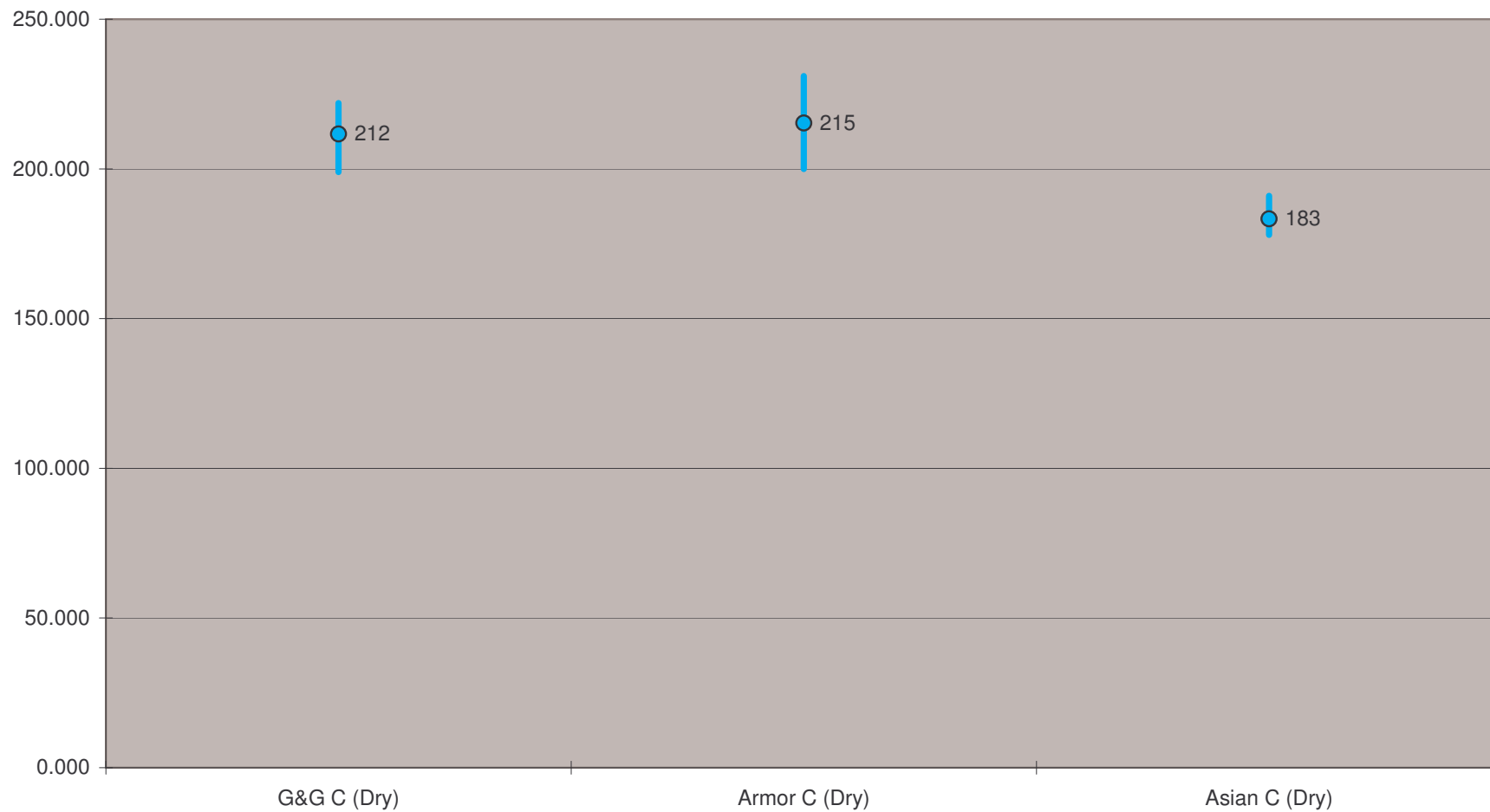
Epson 1290 Black A4 Page Life at 5% Coverage
(Higher scores are better)



Canon i850 CMY Test Results - All Colours**Canon i850 CMY Test Results - All Colours**

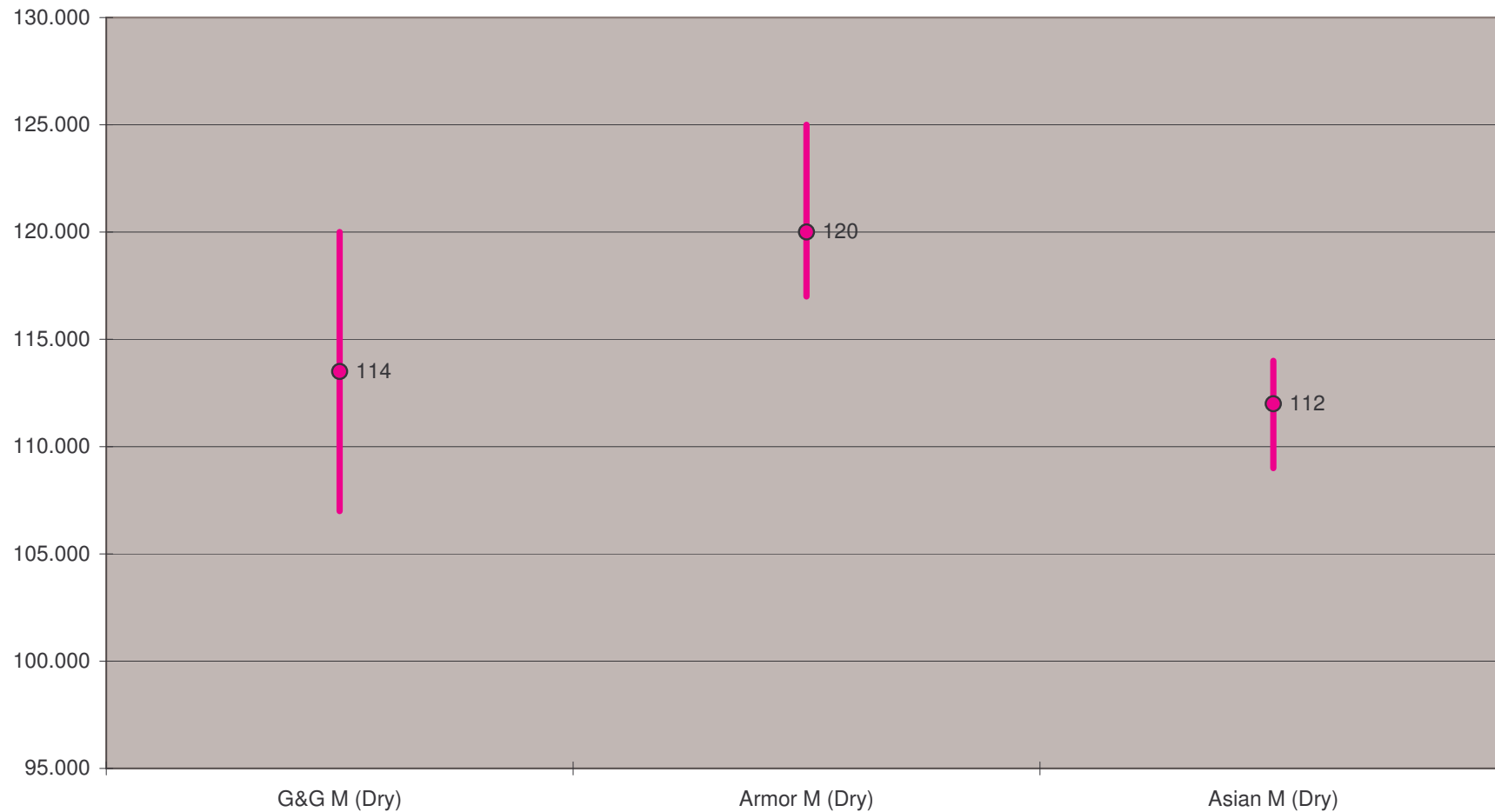
Canon i850 CMY Test Results - Cyan

Canon i850 CMY Test Results - Cyan



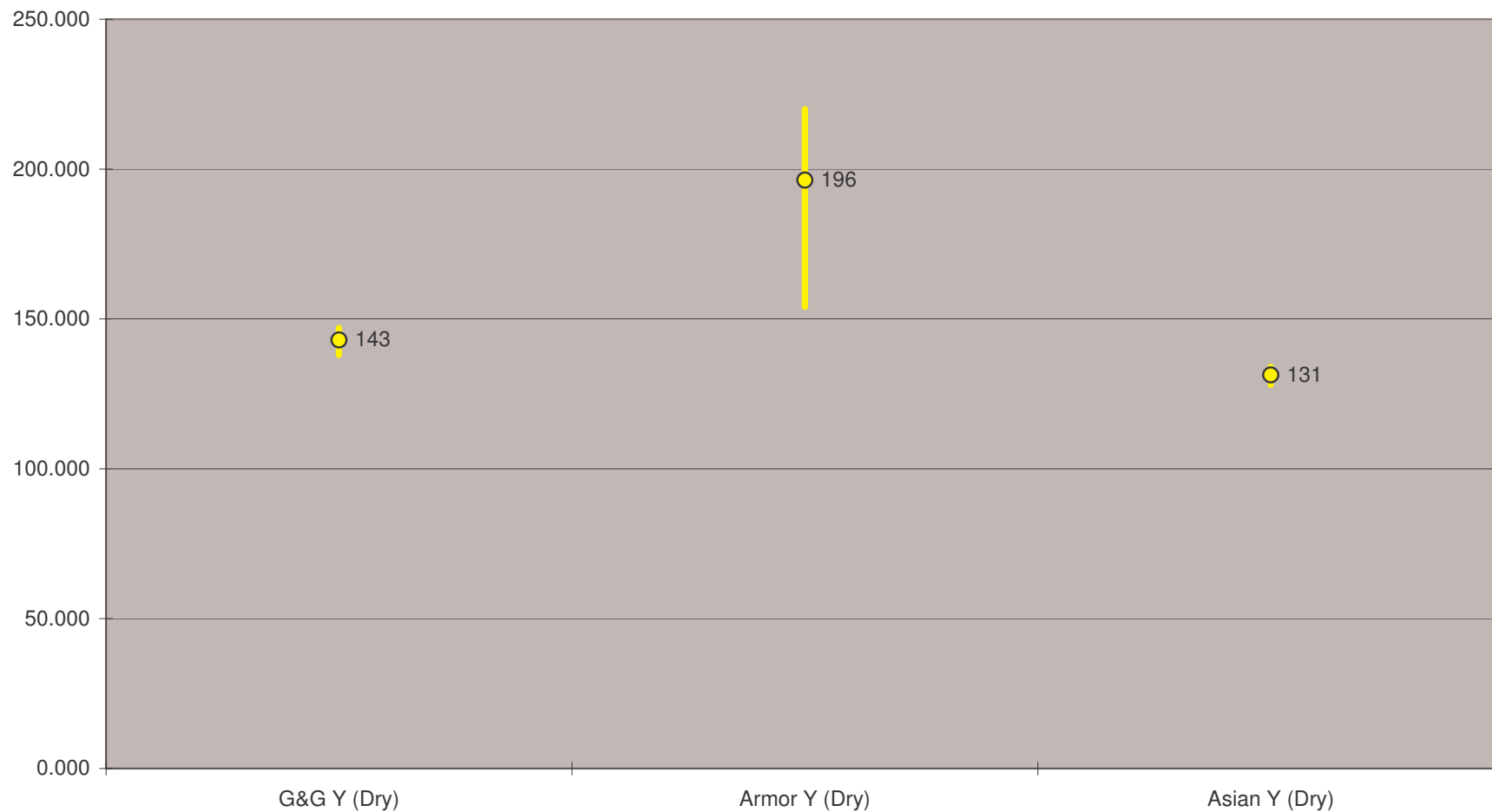
Canon i850 CMY Test Results - Magenta

Canon i850 CMY Test Results - Magenta



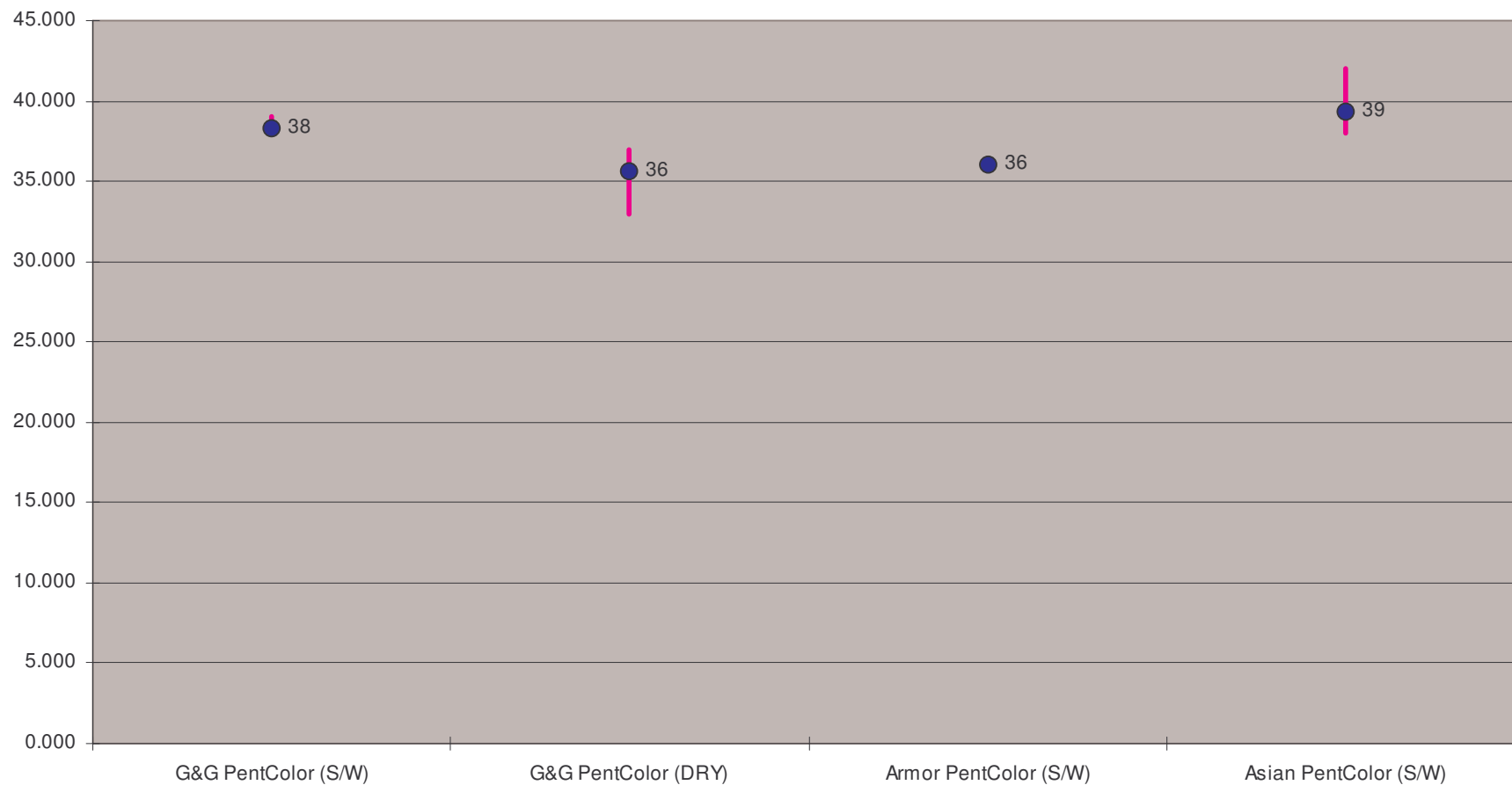
Canon i850 CMY Test Results - Yellow

Canon i850 CMY Test Results - Yellow



Epson 1290 CMY Test Results

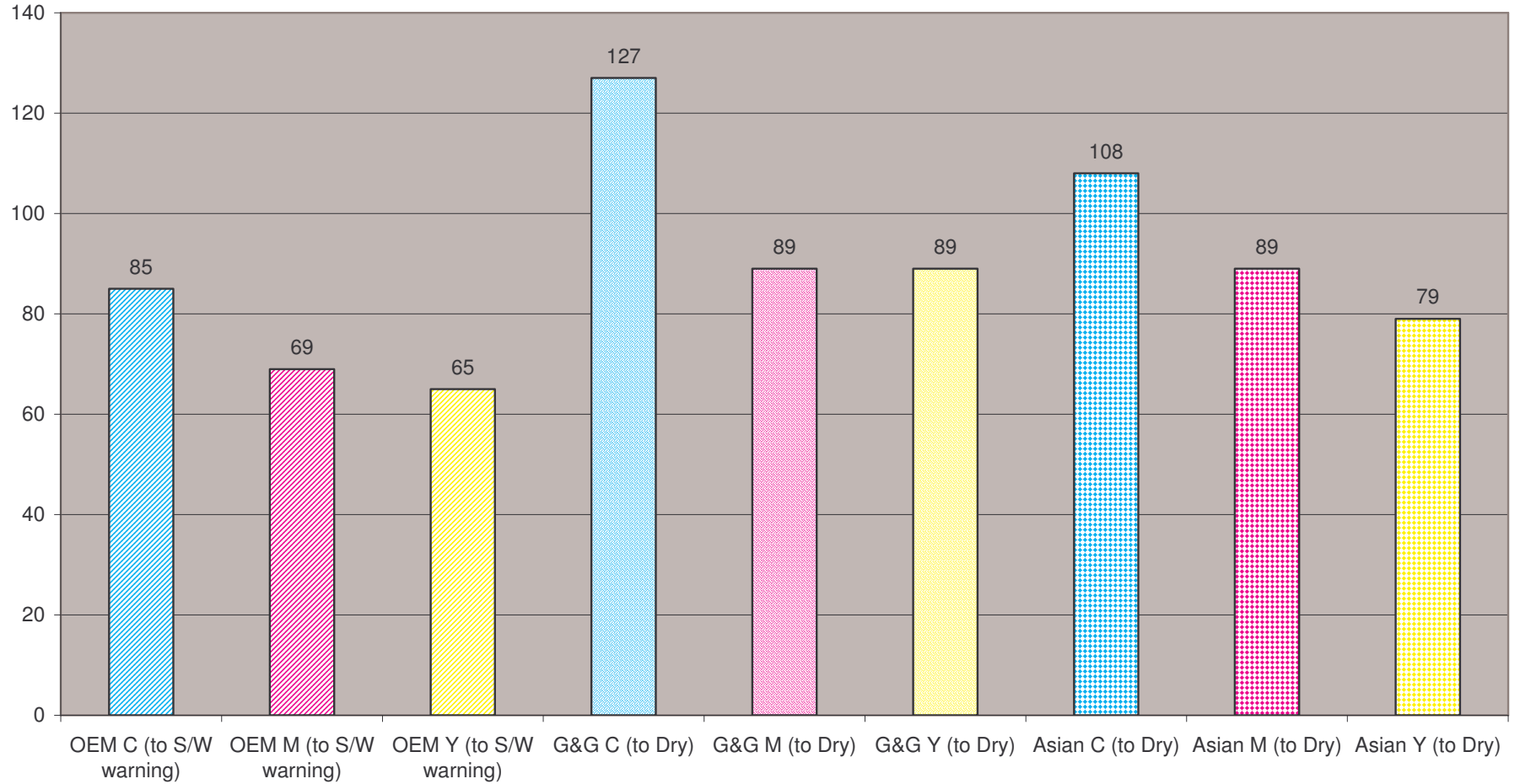
Epson 1290 CMY Test Results



Notes: The G&G cartridge started to run dry before the printer detected the ink had run out, however the test was continued until the printer had calculated the ink was out (the S/W result) and both points plotted. However the “Dry” result is the true indicator of the cartridge life.

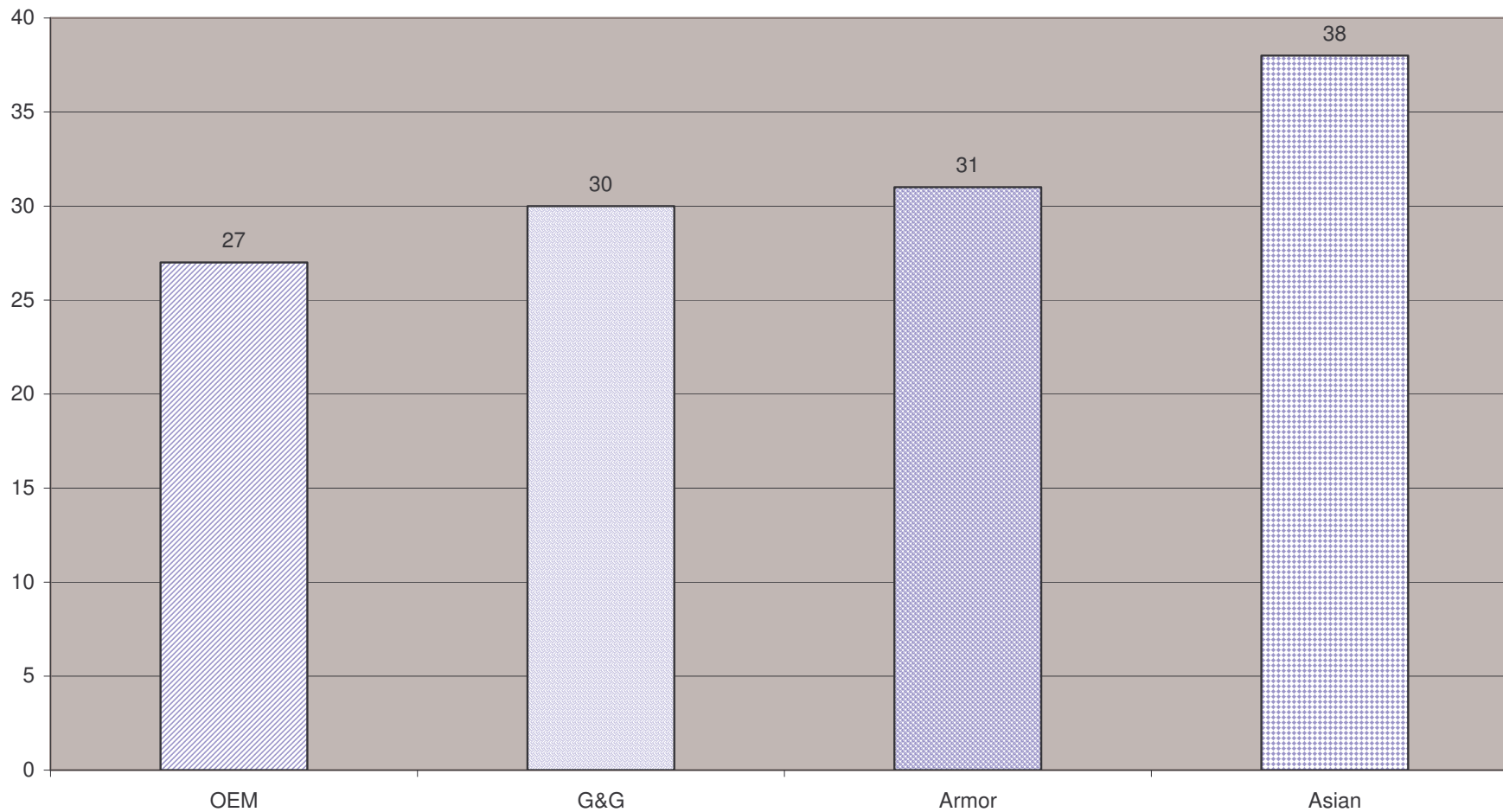
Canon i850 Page Life - Photo Image

Canon i850 Page Life - Photo Image



Epson 1290 Page Life - Photo Image

Epson 1290 Page Life - Photo Image



Paper Quality

Canon i850

Paper-> Ink V	Resolution Matte	Canon Matte	Epson Matte	HP Matte	Resolution Glossy	Canon Photo Paper Plus Glossy (PP-101)	Canon Photo Paper Pro (PR-101)	Epson Photo Paper (S041140)	Epson Premium Glossy Photo Paper (S041285)	HP Photo Paper Glossy	HP Colorfast Photo Paper Glossy
OEM ink	Colour OK	N/A	N/A	N/A	Colour OK	Colour OK	Colour OK	Colour OK	Colour OK	Colour: yellowish all over	Colour OK, large dots, grainy
Armor ink	Colour OK	N/A	N/A	N/A	Colour OK	Colour: very lightly yellowish in monochrome	Colour OK, slightly grainy	Colour: very lightly pinkish over all	Colour OK	Colour: Very lightly yellowish	Colour OK, large dots, grainy
Resolution ink	Colour OK, slightly grainy	Colour OK	Very lightly pinkish	Lightly pinkish	Colour OK	Colour OK	Colour OK, slightly grainy	Colour OK	Colour OK	Colour: Very lightly yellowish in monochrome	Colour OK, large dots, grainy
G&G ink	Colour OK	N/A	N/A	N/A	Colour OK	Colour: lightly yellowish skin and monochrome	Colour: light pink over all	Colour OK	Colour: lightly yellowish skin and monochrome	Colour: pinkish over all	Colour OK, large dots, grainy

Epson 1290

Paper-> Ink V	Resolution Matte	Canon Matte	Epson Matte	HP Matte	Resolution Glossy	Canon Std	Canon Pro	Epson Std	Epson Premium	HP Std	HP Premium
OEM ink	Colour reasonable, clouds slightly washed out, monochrome loss in sharpness	N/A	N/A	N/A	Colour: slightly pinkish sky and clouds	Colour OK	Colour Ok	Light pinkish colouration in sky and clouds	Colour OK	Skin and greens slightly yellowish	Colour OK, large dots, very grainy
Resolution ink	Lightly pinkish over all	Colour OK	Pinkish	Lightly pinkish	Colour OK	Colour OK	Slightly grainy Colour OK	Slightly pinkish over all	Colour OK	Colour OK, Slightly grainy	Colour OK, large dots, grainy

HP 7550

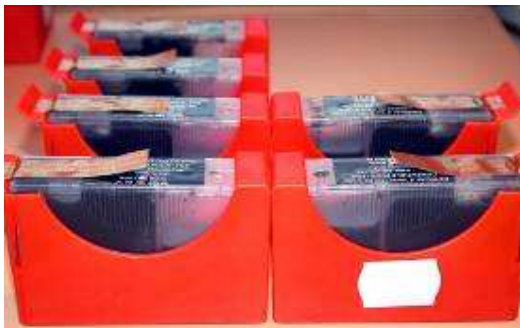
Paper-> Ink V	Resolution Matte	Canon Matte	Epson Matte	HP Matte	Resolution Glossy	Canon Std	Canon Pro	Epson Std	Epson Premium	HP Std	HP Premium
OEM ink	Colour OK	Colour OK	Pinkish	Pinkish	Colour OK, light line traces from guide wheels	Colour OK, Slightly grainy, noticeable line traces from guide wheels	Very grainy, large dots, edges fuzzy, line traces from guide wheels	Grainy, large dots, edges fuzzy, overall pinkish	Colour OK, light line traces from paper guide/feed wheels	Monochrome image is pinkish, light trace guide wheels	Colour OK, Skin little dull

Appendix

Cartridge Ink Fill Levels

Note this testing was only carried out on the original ink samples supplied to the Lab; they were G&G and Armor.

Black



**Figure 1 -
Armor
Black**

**Figure 2 -
G&G
Black**

From a consumer perception point of view the Armor Black cartridge would be perceived as poor value quite simply because it's not full of ink and has a very large empty space. Furthermore, even though the Armor Black has at least the page life of the OEM if it were closer to full would yield many more pages than the OEM at presumably only a slight cost increase to the importer. There was a notable variation in ink levels for the Armor Black cartridges.

The G&G black cartridges also had notable variation in fill levels but most of the cartridges were relatively full and even the worst of the batch we obtained was not as bad as the best of the Armor in terms of fill level.

Cyan



**Figure 3 -
Armor Cyan**

Figure 4 - G&G Cyan

We noted that there was far less variation in the fill level of the Armor Cyan cartridges when compared to the Armor Black cartridge. Admittedly there was still a marked empty volume in the cartridges that may discourage consumers.

The G&G Cyan cartridges also had notable variation in fill levels and unlike the black cartridge there was quite a degree of empty space in the cartridge when compared to the G&G Black.

Magenta

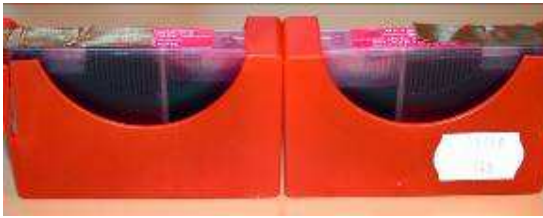


Figure 6 - G&G

Notable variation in fill levels of Magenta cartridges the G&G were in the worst in this with dramatic variations in fill level.



Figure 5 - Armor Magenta

Magenta
respect

Yellow



Again notable variations in fill level with the product the worst in this respect.



Figure 7 - Armor Yellow

Figure 8 - G&G Yellow
G&G