

Ink & Image Durability

Brother LC1200
cartridges

A CharisCo Printer Labs
report for Brother International Europe

July 2014



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Ink & Image Durability - Brother LC1200 cartridges

Executive Summary

Despite the fact that third party, or 'compatible', ink cartridges are priced to undercut the original cartridges from the printer manufacturer (often by a huge percentage), testing shows that the quality of the compatible inks and cartridges does not match the quality of the printer manufacturer's original inks and cartridges, severely compromising the printed result and even the health of the printer itself. The user experience may be badly affected even if the costs of running the printer are reduced by buying the cheap ink.

Cartridge performance and reliability

None of the compatible cartridges proved comparable to the original cartridge, except that several brands produced more pages than the Brother LC1240 cartridges. Specifically: three of the five brands (Brand B, Brand C and Brand E) were susceptible to severe ink leakage before, during or after use; three brands (Brand A, Brand C and Brand D) were liable to fall apart; and cartridges from two brands (Brand A and Brand C) became stuck inside the printer.



Use of compatible inks resulted in a higher level of user-activated print head cleaning cycles (to maintain print quality) while printing. Finding a compatible cartridge that performs anything like as well as the manufacturer originals is a thankless task. Some are better than others, of course, but some (e.g. Brand A and Brand E tested here) result in fatal print head nozzle blockages, requiring a user to replace their printer!

Print quality

Even when freshly printed, the photographic quality of prints using compatible inks or papers does not match prints using Brother original materials. Only Brand C's inks closely matched the optical density produced by original inks, while only glossy paper from photographic specialist Brand B matched the Brother BP71 glossy photo paper. Brand A inks appear to be optimised for the low quality glossy paper, performing best on this paper and poorly on good quality papers.

Only Brother uses pigment black ink, which maximises print quality and durability of black text on plain office paper. Similarly, Brother BP60 inkjet plain paper outperformed the generic office plain paper in almost every test.

Light fastness



No compatible ink and glossy paper combination was capable of resisting light fade like Brother original inks and glossy paper. While the Brother original combination is estimated to have a light permanence of over 550 years, the worst performer (Brand B ink on Brand C paper) failed after just 11 years of exposure.

Only Brand B glossy paper matched the performance of Brother BP71 paper and Brand A was the only compatible ink (when printed on Brother/Brand B papers) to survive more than 100 years.

Water fastness

Only prints using the combination of Brother original inks and papers (both glossy photographs and office prints on Brother BP60 paper) were still usable after the soak test. All compatible inks dissolved, bled or leached into the papers during soaking, rendering them unusable. Brother's papers held the inks better than the compatible photo papers and generic plain office paper and only Brother's pigment black ink held fast on the generic plain office paper.

Cartridge design, performance and reliability

No compatible cartridge brand considered in these tests truly matched the reliability and performance of the manufacturer's originals.

Brand A, Brand B, Brand C and Brand E cartridges are all typical of the generic third party design for later generations of Brother cartridges. This comprises a rigid translucent plastic case one side and a soft cellophane membrane covered by a black snap-on plastic cover the other side, giving the appearance of being professional and appealing and generally similar to Brother originals.

However, there is a critical difference with how cartridges are permitted to breathe so that the ink can flow to the print head. This is handled by a very crude breathing hole at the top of the cartridge, covered with a tape until the time of use. This crude method for breathing causes most of the problems with ink leakages.



Ink leaked from the breather hole even when the cartridges were sitting vertically or lying flat with the breather hole upwards.

Ink leakage

After the tape has been removed, the breather hole is completely open to the outside with only a piece of low density foam as protection. Even though the cartridge manufacturers have attempted to avoid, or minimise, the danger of ink reaching the foam, the result is usually ineffective and this foam offers no real protection at all, allowing ink to flow freely out of the 'empty' cartridge.

Another leakage point can be the hole from which ink flows from the cartridge into the print head. Once the cartridge is used and removed from the printer, this hole should seal and hold remaining ink safely within the cartridge. Several test cartridges, however, allowed ink to run out of this hole onto the user's hands or onto a surface.



Black ink having leaked from black cartridge ink orifice after being removed from printer

Other design issues experienced included:

- the front portion of cartridges becoming detached and even becoming stuck inside the printer
- cartridges needing pliers to be removed from the printer
- cartridges not telling the printer when ink has run out (resulting in wasted ink and time because the printer has to be re-primed with manual cleaning cycles)

'Ink Out' notification

While Brother's inkjet cartridges have always correctly notified the printer when the ink supply is depleted (in all test programs performed on Brother equipment) compatible cartridges cannot be guaranteed to do so. In these specific tests, Brand E's black cartridges were the worst offenders, with three out of the ten purchased failing:

- during black print testing, re-priming of the black ink was required when a black cartridge ran completely dry of ink without telling the printer when it should have been changed. Three manual cleaning cycles were required to re-prime the printer and 1.6ml (82 pages-worth) of ink was used/wasted.
- during colour print testing, two of the three black cartridges failed to inform the printers that they should be changed. These resulted in three manual cleaning cycles to re-prime one printer and two manual cleaning cycles to re-prime the other. More than 2.5ml of ink will have been wasted by having to re-priming, corresponding to about 135 pages.

Nozzle blockage/ manual cleans

Every ink failure - e.g. blocked nozzles - that caused unsatisfactory pages to be printed during testing was noted. In almost every test scenario, compatible cartridges caused nozzle blockages many times more frequently than the Brother cartridges, often resulting in multiple manual cleaning cycles being performed to clean the print head. For instance, during the colour print testing, Brand A colour inks required more than 13 manual cleans to be performed per 100 pages printed - compared to 0.2 cleans per 100 pages printed using Brother original inks (that's 63x more cleans).

Two compatible (Brand A and Brand E) inks caused fatal nozzle blockages and, thereby, print head failures - meaning that the printers became completely unusable and the print heads unrecoverable. In these circumstances, the user would be forced to discard the printer as 'broken' and need to purchase a new printer. The alternative is to attempt a recovery using Brother original ink, and perhaps flush fluid, taking many hours of attention and wasting a huge quantity of ink - with absolutely no guarantee of success. One printer affected still remains unrecoverable.

Brand A inks caused the worst of these problems. During colour print testing, the nozzles blocked within only 139 pages of the cartridges first being inserted. With this set of cartridges, no further prints were possible after 153 pages were printed. All of the remaining ink in the cartridges was wasted through running multiple (36) cleaning cycles in an attempt to get the printer to print again.

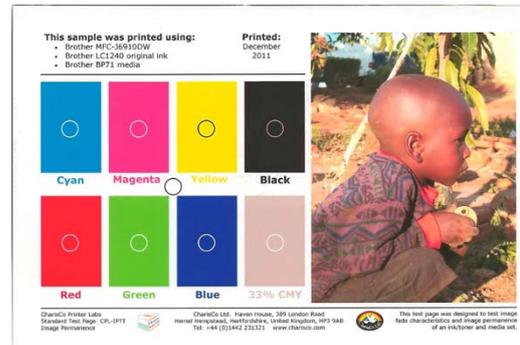
<i>Colour print testing</i>	Brand A ink		Brother LC1240
	First clean @	All cartridges exhausted @	All cartridges exhausted @
Cartridge set 1	195 pages	424 pages	781 pages
Cartridge set 2	173 pages	213 pages	691 pages
Cartridge set 3	139 pages	153 pages	713 pages

It was cartridge set 3, as seen above, that caused the biggest problem - with a total of 38 cleaning cycles undertaken on that one set alone. However, cartridge set 2 required 39 manual cleaning cycles during the test and set 1 required 23 manual cycles.

Print quality

While, on the face of it, it is not instantly possible to tell the difference between office style prints using compatible inks, the visual difference becomes more apparent when comparing photographs.

For instance, compatible inks rarely print to the same density as Brother's inks and may be as much as 25% lighter with plain paper prints but 36% lighter with photo prints. Similarly, average image density (Cyan, Magenta & Yellow) may be as much as 10% lighter on plain paper but 18% lighter with photo prints.



Brother original inks on
Brother BP71 paper

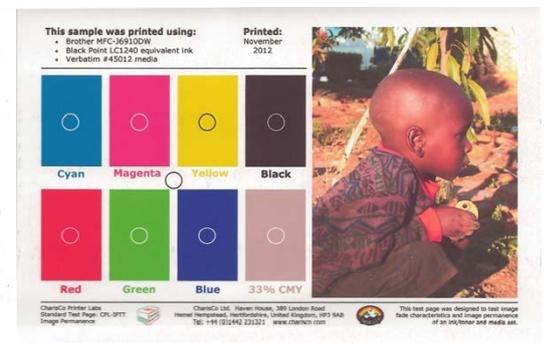
This shows itself on photo prints by them being lighter than prints using Brother original inks. They may also lack contrast, bite and definition (below left). In addition, they may also display a colour cast due to an imbalance in the densities of the three colour inks.

Using the wrong photo paper makes the situation worse, especially because compatible inks are being used in the printer.

Here (below right) we see a comparison of how Brand C inks on Brand A paper look against Brother inks on Brother BP71 glossy paper (above). The result is muddy, lacklustre and lacking contrast and definition.



Brand D inks on Brother
BP71 paper

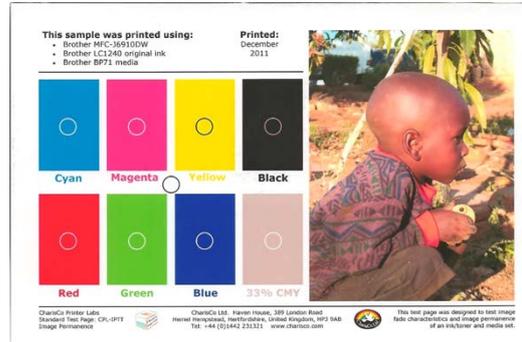


Brand C inks on
Brand A paper

None of the compatible black inks tested use pigment-based black ink, thus not matching the Brother originals and risking coagulation of the ink in the print head (causing nozzle clogging). Pigment particles sit on the surface of plain paper while dye inks soak into the paper and show through more on the reverse side of the paper. Therefore, Brother, like many manufacturers, equips its LC1200 (and other) black cartridges with pigment-based black ink to ensure that black text is sharp, vibrant and resistant to water damage.

Light fastness

There can never be any doubt that the quality of ink is the most important factor in the light fastness properties of a print. Paper quality then has an additional, but relatively minor, impact on a print's ability to resist light fade.



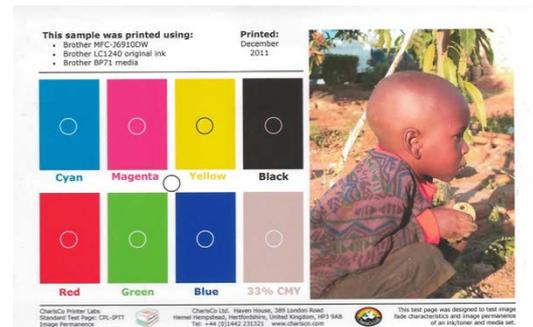
Brother original inks on Brother BP71 paper before exposure to light

Sample photo prints were exposed to an intense light source for the equivalent of 100 years where a print is on display under glass in a typical environment where artificial lighting is on for 10 hours a day (fade under direct sunlight is much faster). The samples using Brother original inks and Brother BP71 glossy photo paper were then exposed for a further 100 years—200 years total.

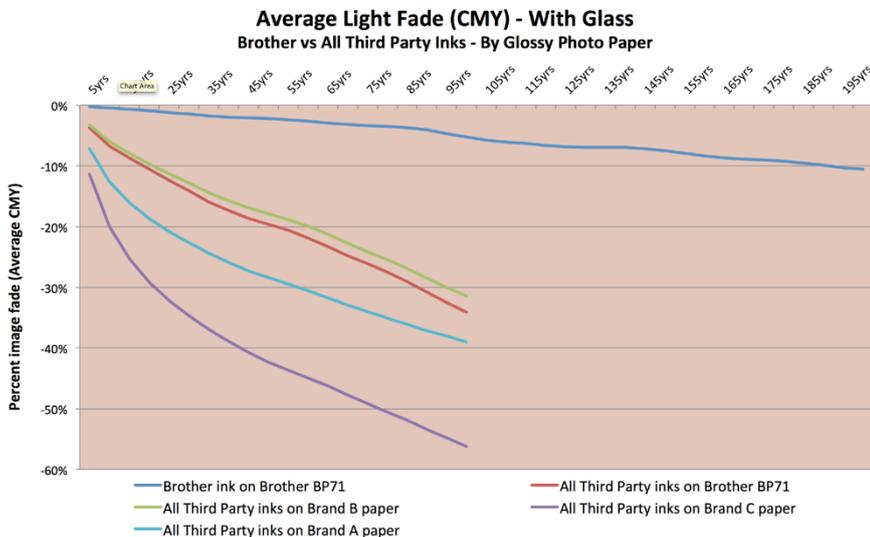
While the Brother original print lost only 10.6% average image density over 200 years, the worst performer, Brand B inks printed on Brand C paper, lost 37.7% average image density after only 15 years of exposure.

A print is considered to have 'failed' when 30% image loss is recorded. Therefore, the Brand C sample failed at 11.1 years while failure for the Brother sample would be estimated at 567 years.

In some instances, such as the image below right, printed with Brand C inks on Brand C paper, lost the yellow so completely that the yellow colour block is no longer visible at all.



Brother original inks on Brother BP71 paper after 100 years light exposure

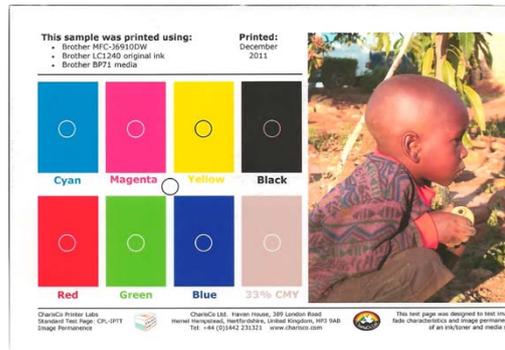


Brand C inks on Brand C paper after 100 years light exposure

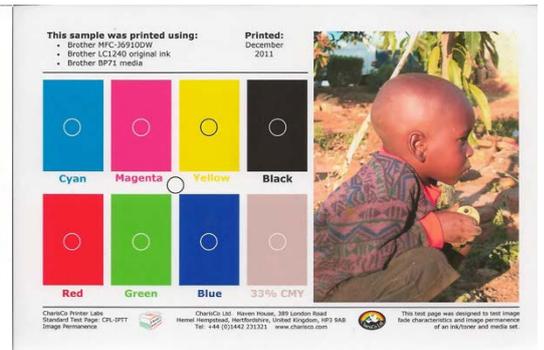
Water fastness

Prints may at times be subject to water damage. Testing shows that Brother original inks and papers resist water damage to a significantly higher degree than compatible inks and papers. Compatible inks and papers were severely affected, losing contrast, with inks both soaking out of and leaching into the paper.

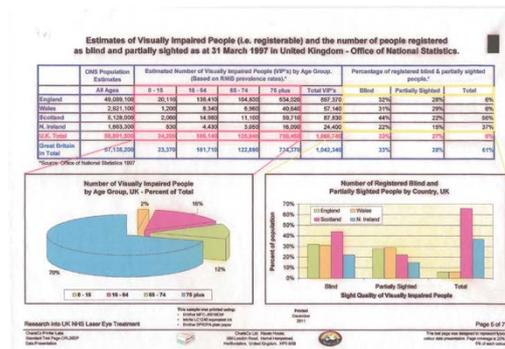
Photo prints and office prints were soaked in de-ionised water for 24 hours and then allowed to dry. Print samples exclusively using Brother materials were affected little.



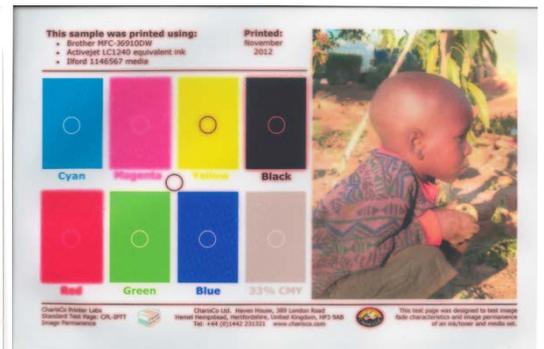
Brother original inks on Brother BP71 paper before soaking



Brother original inks on Brother BP71 paper after soaking - still usable

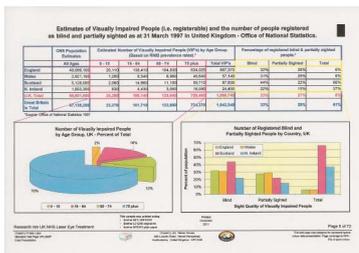


Brand B ink on Brother BP71 paper after soaking - unusable

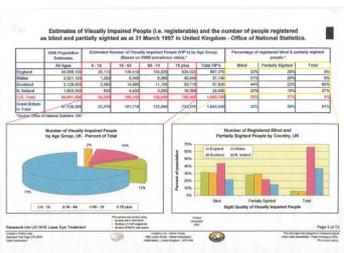


Brand E ink on Brand B paper after soaking - unusable

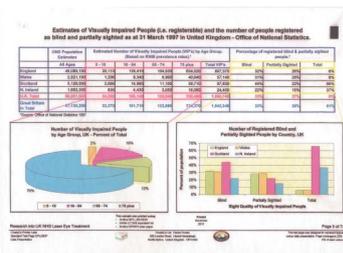
Where office prints are concerned, dye inks are severely washed out of the generic plain paper while Brother's pigment black ink holds fast regardless and the Brother BP60 inkjet paper holds even dye inks reasonably well. Brother inks on Brother BP60 paper are completely usable while, at the other end of the scale, prints using compatible inks on generic plain paper are totally unusable—some colours have dissolved away completely, while others are simply so blurred that the text is unreadable.



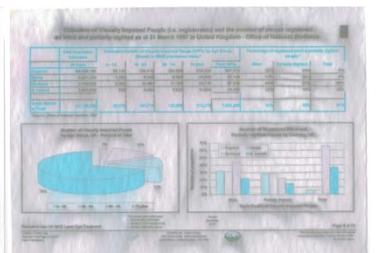
Before soaking Original print



After soaking - Brother inks on Brother BP60 paper



After soaking - Brand B inks on Brother BP60 paper



After soaking - Brand B inks on Generic office plain paper

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