

materialised

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CERTIFICATE
OUTDOOR LIGHTFASTNESS

FR1

UV INK FOR ROLL TO ROLL PRINTERS

Result

Very good - minimal colour change after 6 years

Testing Parameters

The lightfastness was tested according to ISO 16474-2 (paints and varnishes - methods of exposure to laboratory light sources - part 2: Xenon-arc lamps). The test was performed in a Xenotest 440 by Atlas Material Testing Solutions, using the following parameters:

Energy	60W/m ²
Chamber temperature	38°C
Black standard temperature	65°C
Relative humidity	50%

The light irradiated by the Xenotest 440 equals 10 times the force of natural outdoor light of an average Central European day. A testing period of 40 days is equivalent to one year of outdoor irradiation.



Kilian Hintermann
CEO



Marco Eicher
Ink Laboratory Manager

Kriessern, July 2021

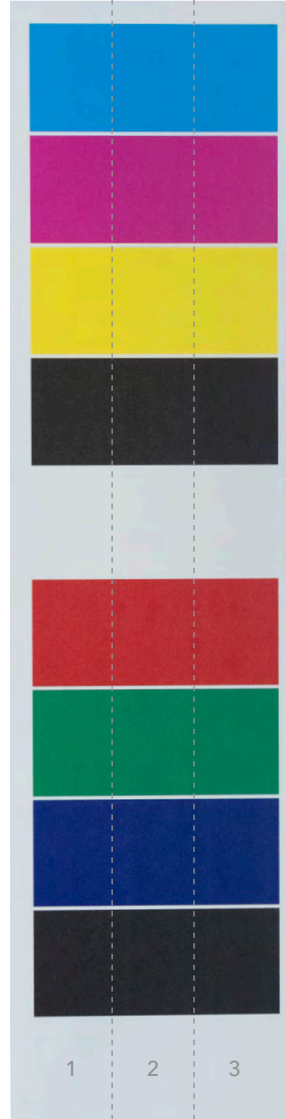
Primary (CMYK), secondary (RGB) and tertiary (K340%) colours

Reference sample

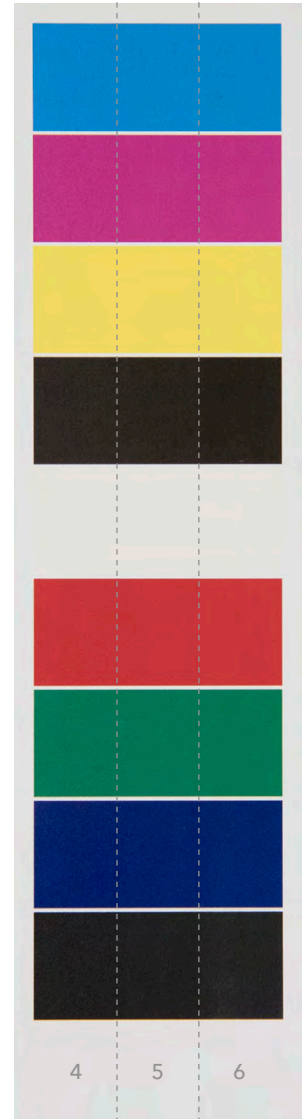


Not irradiated reference

Exposed samples



1 = 1 year irradiation time
2 = 2 years irradiation time
3 = 3 years irradiation time

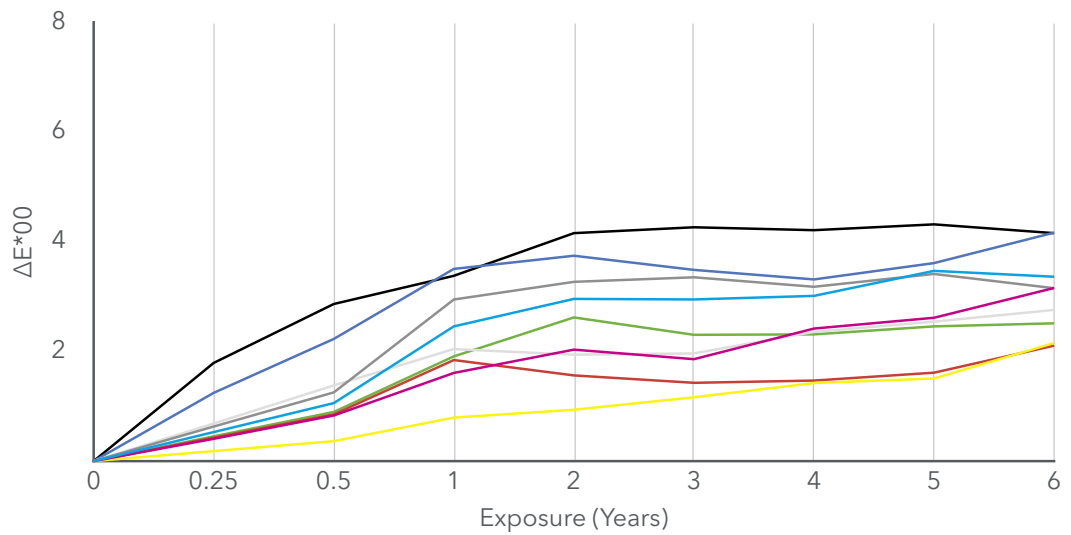


4 = 4 years irradiation time
5 = 5 years irradiation time
6 = 6 years irradiation time

This image is not colour-binding, it only serves to show the changes.

Measurement results

Delta E values: $\Delta E_{00} < 4.3$ @ 6 years (CMYK+W and colour combinations)
Colorimetric values L^* , a^* and b^* measured with Barbieri LFP qB Spectral
Photometer (Log Nr. swissQprint 1125)



- Black 340%
- Blue
- Green
- Red
- White
- Black
- Yellow
- Magenta
- Cyan

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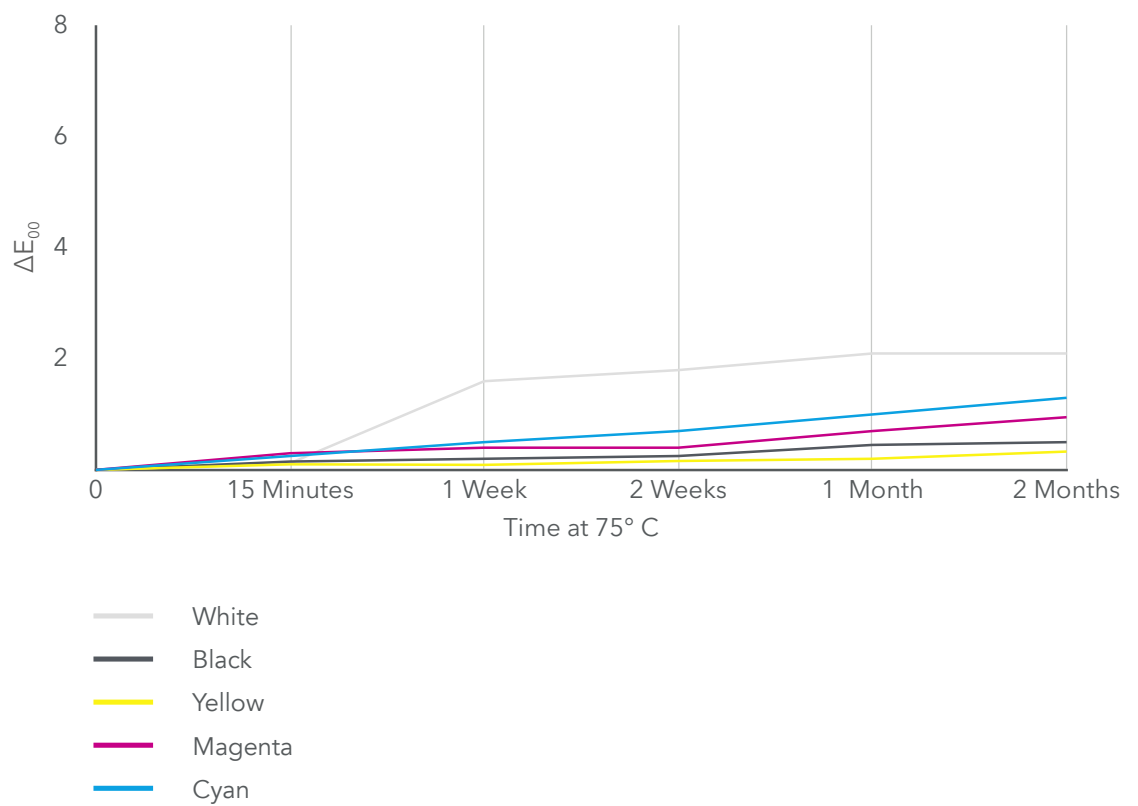
CERTIFICATE
PROLONGED HEAT EXPOSURE

FR1

UV INK FOR ROLL TO ROLL PRINTERS

Result

Very good - minimal colour change



$\Delta E_{00} < 1.3$ after two months at 75° C (CMYK)

$\Delta E_{00} < 2.1$ after two months at 75° C (W)

Colorimetric values L^* , a^* and b^* measured with Colibri CM-25cG Spectral Photometer (Log Nr. swissQprint 1253)

Testing Parameters

Prints that were exposed to heat for a prolonged period of time have been tested in terms of colourfastness. The samples were exposed to 75° C for different time intervals. The tests were performed in a Memmert UF260plus drying chamber, using the following parameters:

Chamber temperature	75° C
Duration	up to 2 months
Air circulation	100 %



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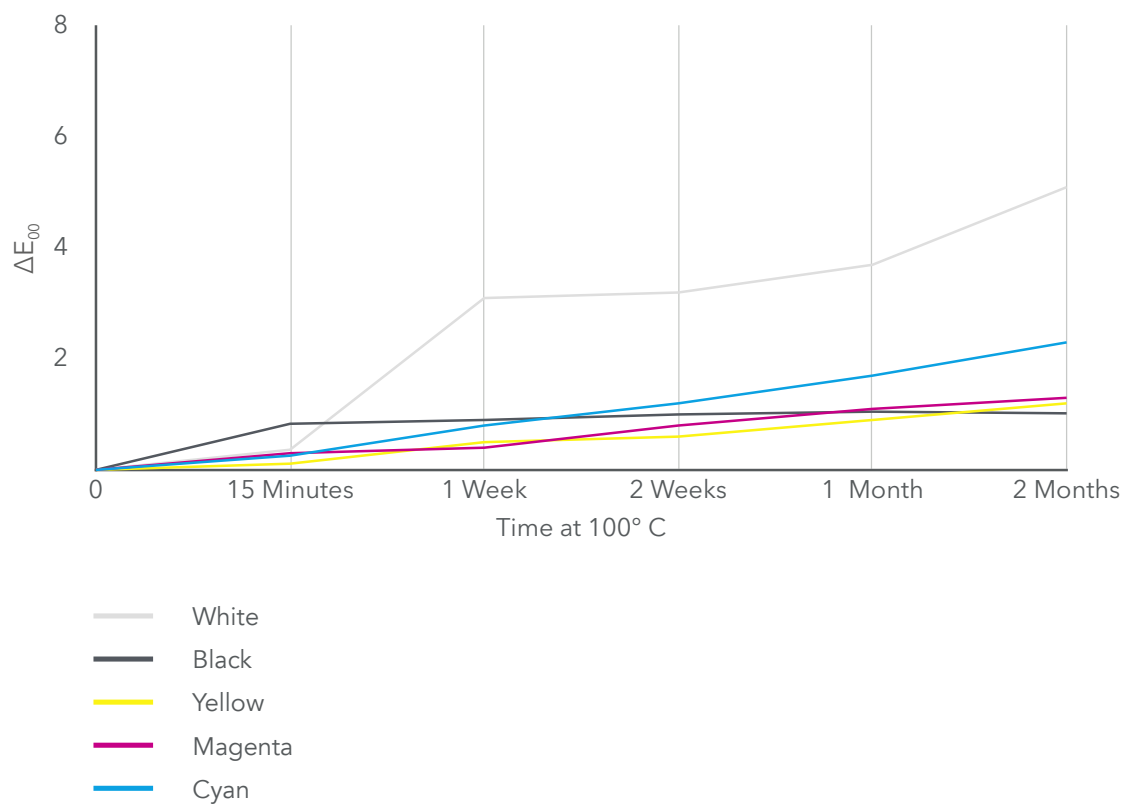
CERTIFICATE
PROLONGED HEAT EXPOSURE
COLOURFASTNESS
AT EXTREME CONDITIONS

FR1

UV INK FOR ROLL TO ROLL PRINTERS

Result

Good - little colour change



$\Delta E_{00} < 2.3$ after two months at 100° C (CMYK)

$\Delta E_{00} < 5.1$ after two months at 100° C (W)

Colorimetric values L^* , a^* and b^* measured with Colibri CM-25cG Spectral Photometer (Log Nr. swissQprint 1253)

Testing Parameters

Prints that were exposed to heat for a prolonged period of time have been tested in terms of colourfastness. The samples were exposed to 100° C for different time intervals. The tests were performed in a Memmert UF260plus drying chamber, using the following parameters:

Chamber temperature	100° C
Duration	up to 2 months
Air circulation	100 %



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Kriessern, September 2021

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CERTIFICATE
POST-PRINT HEAT TREATMENT
COLOURFASTNESS

FR1

UV INK FOR ROLL TO ROLL PRINTERS

Result

No Qualification

Testing Parameters

The colourfastness of prints that were post-print heat treated was tested. The samples were exposed to different temperatures for a fixed period of time. The test was performed in a Memmert UF260plus drying chamber, using the following parameters:

Chamber temperature	70 -180 °C
Duration	15 min.
Air circulation	100 %

As the drying chamber was opened to add the samples the following temperature deviations were recorded:

70 - 100 °C: ± 2 °C after 2 minutes of adding the samples
110 - 180 °C: ± 2 °C after 3 minutes of adding the samples



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Marco Eicher
Head of Ink Laboratory

Kriessern, October 2019

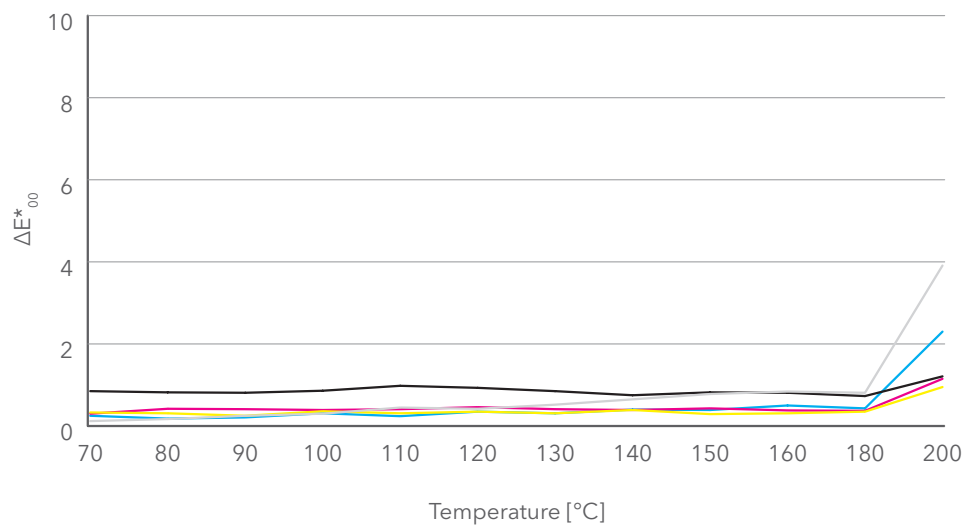
Measurement results

Delta E values: $\Delta E_{00} < 2.5$ @ Temperatures up to 180 °C

(CMYK+W and colour combinations)

Colourimetric values L^* , a^* and b^* measured with Barbieri LFP qB Spectral Photometer (Log Nr. swissQprint 1125)

The Delta E values at 200 °C were determined to illustrate the loss in colourfastness at this temperature.



- Cyan
- Magenta
- Yellow
- Black
- White

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