

# PRINT PERMANENCE CHART

Print Type	Description	Deterioration Risk <sup>3</sup>	Life Displayed <sup>4</sup>	Life Under UV Glass <sup>5</sup>	Life in Dark Storage <sup>5</sup>	Strength/Weakness
<b>DSI Digital Silver Fiber Print®</b> (Silver Gelatin Black & White)	Black & white, light-sensitive silver bromide photo paper that is exposed with a photographic laser and processed in liquid photo chemistry. Prints are air dried on a rack then flattened in a heat press. Silver gelatin prints have been in common use since 1874, and they are the only type of print to be in continuous production for over 140 years.	Moderately-Low air pollutants and moisture are the greatest threats	100+ years to Unknown. These prints could last for centuries depending on processing and the paper base <sup>6</sup> . Toned prints are expected to have a longer archival life.	100+ years to Unknown. These prints could last for centuries depending on processing and the paper base <sup>6</sup>	140+ years to Unknown. These prints could last for centuries depending on processing and the paper base <sup>6</sup>	<b>Strengths</b> - Exceptionally fade resistant. Beautiful tonal range, high resale value, no color cast, can be chemically toned for added permanence. <b>Weakness</b> - prints curl in humid environments, best mounted or matted and framed
<b>DSI Digital Silver RC Print®</b> (Silver Gelatin Black & White)	Black & white, light-sensitive silver bromide photo paper that is exposed with a photographic laser and processed in liquid photo chemistry. The silver gelatin is on a polyethylene layer that allows these prints to lay flat. RC prints can be heat dried for quicker delivery times.	Moderate air pollutants and moisture are the greatest threats	60 to 70 years. Toned prints are expected to have a longer archival life.	100+ years to Unknown - no found data	100+ years to Unknown - no found data	<b>Strengths</b> - Fade resistant. Lustre (Pearl) surface, lays flat, lower cost, bright white base, can be chemically toned. <b>Weakness</b> - not as heavy weight as fiber paper, RC base not as archival as fiber base.
<b>Digital Silver Imaging Museum Quality Pigment Print</b> <sup>-1,2</sup>	Color pigment print, made with pigment inks on a fine art, acid free paper, with no OBAs (Optical Brightening Agents)	Low	61-108 years	200 years	200+ years - unknown	<b>Strength</b> - Excellent color reproduction that matches digital RGB capture. Highly stable and fade resistant, excellent humidity-fastness. <b>Weakness</b> - Fragile surface on some mat surface papers.
Home and office Inkjet Prints <sup>6</sup> (dye and dye sublimation technology). Note: quality varies greatly by manufacturer and type of printer and paper used.	These prints are made on inkjet printers that do not use pigment inks and do not print on archival papers. Most home and office prints fall in this category.	Very High	4 months to a maximum of 65 years	4 months to a maximum of 82 years	Unknown - no found data	<b>Strength</b> - inexpensive <b>Weakness</b> - poor quality, not permanent, inaccurate color reproduction, low resolution.
Digital C Print / Fuji Crystal Archive (aka. Lambda Print)	These are light sensitive digitally exposed prints that are processed in liquid photo chemistry. This is a color material that is often used to produce black & white images as well.	Moderately High - because of fading when exposed to UV light	26-40 Years Depends on processing equipment used.	Wilhelm Research rates at less than 20 years <sup>10</sup> - 60 years as stated by the manufacturer	Unknown - no found data	<b>Strength</b> - very good color reproduction, continuous tone. Low cost. <b>Weakness</b> - average lightfastness when not under UV glass, fragile surface. Quality dependant on processing. B&W prints made on this material can show a color cast.
Digital C Print / Kodak Professional Endura Premier Paper <sup>7,8</sup> (aka. Lambda Print)	These are light sensitive digitally exposed prints that are processed in liquid photo chemistry. This is a color material that is often used to produce black & white images as well.	Moderately High - because of rapid fading when exposed to UV light	20 Months - 100 Years <sup>8</sup> "20 months for high-intensity commercial reflection display under 5000 lux" - Kodak	Wilhelm Research rates at less than 20 years <sup>10</sup> - 100 years <sup>8</sup> as stated by the manufacturer	200 Years <sup>8</sup>	<b>Strength</b> - very good color reproduction, continuous tone. Low cost. <b>Weakness</b> - poor lightfastness when not under UV glass, fragile surface. (Optical Brightening Agents) B&W prints made on this material can show a color cast.
HP Indigo Digital Press Prints / Used by many photo book publishers and high volume print houses such as Shutter Fly <sup>9</sup> and Baybook by BayPhoto.com Both 4 and 6 ink processes are included.	These prints are produced by an electrophotographic process that uses liquid pigment inks. Quality and archival life depend greatly on the paper printed on. These prints are widely used to make photo books, posters, and marketing materials. Papers used to determine permanence: Kromakote Digital and Felix Schoeller E-photo paper. Both have UV brighteners.	High - because of fading when exposed to UV light	13 - 23 Years	29-54 Years	200 Years	<b>Strength</b> - wider color gamut than digital C prints, low cost, high speed production, stand up well to handling. <b>Weakness</b> - not considered an archival print, designed for long print runs, limited paper choices.

**1.** Pigment Inks are the only inks used by Digital Silver Imaging. **2.** Wilhelm Research, The Permanence and care of analog and digital photographs - FotoCoservacion 2011, June 20-23, 2011 **3.** Deterioration risk as determined by the University of Illinois, <https://psap.library.illinois.edu/collection-id-guide/photoprint> **4.** [https://www.getty.edu/conservation/publications\\_resources/pdf\\_publications/pdf/atlas\\_silver\\_gelatin.pdf](https://www.getty.edu/conservation/publications_resources/pdf_publications/pdf/atlas_silver_gelatin.pdf), Wilhelm Research - HP Indigo Digital Presses - Print and Photobook Page Permanence **5. & 6.** A Survey of Print Permanence in 4x6-Inch Consumer Digital Print Market 2004-2007, [www.wilhelm-research.com](http://www.wilhelm-research.com), [http://www.wilhelm-research.com/Collected\\_Papers/The\\_Wilhelm\\_Research\\_Archives\\_Volume\\_1\\_Technical\\_Publications\\_1968-2015\\_\(v4.5\\_2015-02-15\).pdf](http://www.wilhelm-research.com/Collected_Papers/The_Wilhelm_Research_Archives_Volume_1_Technical_Publications_1968-2015_(v4.5_2015-02-15).pdf) **7.** <http://imaging.kodakalaris.com/sites/prod/files/files/resources/paper-endura-techpub-e4070.pdf> **7.** <http://imaging.kodakalaris.com/sites/prod/files/files/resources/paper-endura-techpub-e4070.pdf> **8.** Kodak uses different permanence testing standards than Wilhelm Research **9.** [ftp://ftp.hp.com/pub/printers/HP\\_Exstream/Shutterfly\\_4AA0-1195ENWrr.pdf](ftp://ftp.hp.com/pub/printers/HP_Exstream/Shutterfly_4AA0-1195ENWrr.pdf), <https://globenewswire.com/news-release/2017/08/16/1086575/0/en/HP-wins-five-year-Shutterfly-deal-accelerates-digital-print-momentum.html> **10.** [http://www.wilhelm-research.com/Articles/one\\_for\\_the\\_ages/Fine\\_Art\\_Print\\_Permanence%E2%80%933PDN\\_Magazine%E2%80%933May\\_2016.pdf](http://www.wilhelm-research.com/Articles/one_for_the_ages/Fine_Art_Print_Permanence%E2%80%933PDN_Magazine%E2%80%933May_2016.pdf)