

Permanence and Durability Standards and Their Impact on the Fulfillment Industry

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Abstract

Standardized testing and reporting of image permanence and durability performance using ISO standardized methods allow photo fulfillment companies to assess and promote product performance in a way that is easily comparable by both professional fulfillment laboratories and consumers. Standards in development on the durability assessment of photo books and stability performance ratings of consumer prints will provide a clear, common comparison among products and allow a better understanding of these attributes by the consumer. This in turn can help grow the photo printing industry by encouraging printing and promoting the value inherent in the long term permanence of photographic quality prints and photo books.

Introduction

ISO Technical Committee 42 (TC42) on Photography, Working Group 5 continues to move forward in the development of standards relating to the physical properties and image permanence of photographic materials. These standards are aimed at providing test methods for the measurements of stability and durability of the substrates and materials used to produce photographic images of all types. With the growth of digital imaging and new digital print materials in addition to traditional silver halide materials, new tests methods were developed to cover the new print technologies of ink jet, thermal dye transfer, and electrophotographic media. Further, these new technologies, especially electrophotographic, have resulted in the convergence of the production of images from the traditional photographic sources with those using graphic arts technologies. A detailed discussion of standards published in 2011, 2012, and 2013, was reported in previous papers [1, 2]. This paper will provide an update on the benefit of standards relating to photo books and print stability performance ratings.

Relevant Standards Summary

Summaries of the method standards relating to the four environmental factors causing image degradation were discussed previously [2]. These standards cover degradation due to heat, light, humidity, and atmospheric pollutants and are, respectively, ISO 18936:2012, ISO 18937:2014, ISO 18946:2011, and ISO 18941:2011. These standards are relevant to the single page stability of photo book images, and are also the foundation of the 18940 image stability rating standard.

18940 – Imaging materials – Reflection colour photographic images – Indoor stability specifications for consumers

The goal of the first phase of this standard is to provide specifications for rating the image stability of photographic prints to fixed doses of the four environmental degraders – heat, light, humidity, and atmospheric pollutants. This is done in the context of a consumer home using ISO test methods published in the last few years. Those method standards are: ISO 18936 (heat), ISO 18937 (light), ISO 18946 (humidity), and ISO 18941 (ozone). These methods provide test protocols for digitally-printed hardcopy images and traditional analog photographic color print images.

Ideally an actual prediction of the print life is desirable but is extremely difficult to accomplish in reality. The results obtained with any single test method may be useful for comparing the related image stability of different products and systems, but may not match the actual behavior in the long term, real world conditions. Making a prediction requires an “endpoint”, the point at which the life of the print is ended. This is highly variable depending on the subject and personal connections to the print. Studies have shown acceptable endpoints range as low as 15% fade and as high as 70% fade from the original print [3, 4, 5]. This alone can create a large variation in predicted life.

The complications increase further when one attempts to define specific ambient conditions for light, heat, humidity, and ozone, the “proxy” for atmospheric pollutants, in a “typical” consumer home to use for data extrapolations from the test conditions to the real world conditions. Studies from around the world [6] showed that reasonable assumptions can be made but also showed that there are wide levels of variability in conditions from country to country and region to region. A prediction based on a single set of assumptions will be invalid if any of the conditions vary from the assumption [7]. Because the conditions in consumer homes around the world can vary significantly, it becomes impossible to make accurate predictions based on a single set of assumptions; if attempted, predictions can vary significantly. Many in the industry feel that a bad standard, that is, one that over- or under-predicts, is worse than no standard at all.

Finally, a prediction is further complicated because there are interactions among the four factors that cannot be quantified through individual test conditions.

ISO 18947:2013 – Imaging materials — Photographic reflection prints — Determination of abrasion resistance of photographic images

Newly published in May of 2013, the abrasion standard is a key component of the photo book method standard being developed. It specifies tests to determine the abrasion, scuff, and smudge resistance of photographic images and is applicable to both digital and analog prints. This method is one of a series relating to image durability. In contrast to image permanence standards that cover ever-present environmental factors such as light, heat, ozone and humidity, the durability standards cover factors that are not necessarily present in the environment. Although consumers may have less control over the environmental factors in which a print is stored or displayed, they may have more control over durability aspects such as careful handling and good quality storage enclosures.

18948 – Imaging Materials – Photo Books – Test Methods for Permanence and Durability

As the number of digital cameras has increased, photo books have replaced the traditional photo album and scrapbook for many consumers and there is an increasing interest in their inherent longevity and durability. Photo book longevity depends on the image stability of the printed pages and the cover, if it includes an image, and on the durability of the binding. Some books may have good image print stability but lack in binding durability. The photo book standard will be a collection of test methods that will include the ISO image permanence and abrasion test methods discussed above, as well as several ISO and other test organization methods used in the book binding industry. Inclusion of actual product usage experience from the market during development of this new method standard will insure relevance of the standard to the products being delivered by the digital photo industry.

Photo books, a growth category in the fulfillment industry, when tested according to this future standard will provide the “level playing field” assessment that will help further grow the category by giving consumers useful product comparison information. These comparative assessments will in turn stimulate quality improvements from the manufacturers resulting in higher quality, more durable products for the fulfillment industry to provide to the consumer.

Fulfillment Industry Benefit

In general, the goal of the International Organization for Standardization is to provide standards for use as strategic tools for business to facilitate “level playing field” comparisons that promote worldwide global trade. Proper use of the permanence and durability standards can result in the growth of printing. By assessing products in conjunction with the appropriate standards that reflect the actual applications and usage conditions of the product, these standards provide a large benefit in product promotion. For stability assessment against the four environmental factors, use of 18940 and the corresponding method standards can be used to promote the strength of

digital silver halide and thermal dye transfer technologies for long term dark stability and their robustness to heat, humidity, and pollutants. Similarly, this standard, in conjunction with the 18948 photo book method standard can be used to promote the long term image stability and physical durability of photo books. By providing standardized product comparison information to consumers their confidence in the ability of the products to endure for multiple generations will be enhanced and the perceived value of these products will be increased. This in turn can be used to highlight the value of these products for the long term preservation of the images that capture the important events in consumers’ lives, without the worry of the inevitable technology obsolescence of digital image files [8]. With longevity comparisons backed by the assurance of the ISO permanence and durability standards, the sales growth of prints and photo books, the photo album of the 21st century, will continue to accelerate.

Conclusions

This paper has provided a summary of image permanence and durability standards in development from ISO Technical Committee 42 Working Group 5 relating to permanence performance of prints and photo books. This includes the required protocols found in the recently published ISO standards on stability and durability to be used in the performance assessment. It has also discussed the benefit these standards will provide to the photo fulfillment industry to facilitate “level playing field” comparisons that can be used to promote the long term longevity benefits of hard copy prints and photo books. Proper use of the permanence and durability standards in product promotions can increase the awareness of the value of these products and result in the growth of printing.

References

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Author Biography

Joseph LaBarca is a 17-year member of the ISO Technical Committee on Photography and is directly involved in the ANSI/IT-9 and ISO Working Group 5 Committees on color print stability and physical properties. After retiring from Eastman Kodak Company with over 34 years of continuous service Joe formed JEL Imaging Services in 2010 and Pixel Preservation International in early 2011, to provide consulting services to the imaging industry on image preservation, ISO standards, and image quality. He graduated from Bucknell University in 1976 with a Bachelor's of Science Degree in Chemical Engineering and spent a large part of his career at Kodak in the research, development,

and commercialization processes for Kodak Ektacolor papers and processing chemistry. This included extensive involvement in the image stability of color papers beginning in the early 1980s and continuing for the remainder of his career at Kodak. In 1997, Joe was appointed Senior Research Lab Manager, directing a laboratory with systems responsibility for professional color negative films and papers. In 2004 Joe assumed the role of Technical Director, Image Permanence with responsibilities that included silver halide, inkjet, thermal dye transfer, and electrophotographic imaging systems. Joe has been a member of IS&T for over 26 years and was awarded Senior Membership in 2012. He has also been a member of the American Institute for Conservation since 2008. In mid-2011 he was appointed to the position of Visiting Scholar in the College of Imaging Arts and Sciences at Rochester Institute of Technology.