

Light fastness

Whenever a printer uses the term light fastness to describe a quality of the inks used, he or she is referring to the actual resistance of the print against discoloration or fading caused by UV radiation. Consequently the light fastness categories of printing ink, which is based on the wool scale, refers only to the ink's UV stability. However, very few people know how these light fastness levels are determined, what they mean and why some inks fade more quickly than others.

What is light fastness?

The term light fastness was standardized under DIN 16525 Testing of Prints and Print Inks in the Graphic Industry in 1965. On the one hand, the standard specifies the requirements for testing print products for light fastness. On the other hand, it also defines how light fastness is to be determined. Consequently, if one is talking about the print as such, the term light fastness refers to the resistance of the printed product against fading caused by UV radiation in the absence of a direct impact of other weather conditions, such as fluctuations in temperature or humidity levels. The light fastness of printing ink, on the other hand, is derived from the resistance a standard specimen produced with the ink pursuant to DIN 16519. However, light fastness is not to be confused with the volatility of printed products when exposed to weather conditions. After all, the duration of color fastness is of course contingent not only upon the amount of light radiation, but also upon other external conditions, which in turn have been defined in DIN 54071. As a result, light fastness is only one factor among several others that have to be considered in the production of your printed products.

Light fastness benchmarks and units

On printing ink products, you will find information about the light fastness of the product, which is listed in so-called light fastness levels. They indicate a certain level of stability of the full color when exposed to UV radiation. These light fastness levels consist of a scale of eight blue type colors on wool divided by their levels of light fastness. This is why the scale is also called the Wool Scale (WS). It is divided as follows:

1 = very low 3 = moderate 5 = good 7 = supreme
2 = low 4 = reasonable 6 = excellent 8 = outstanding

However, this information does not only provide a vague idea as to how long a printed product may be exposed to the sun before its colors begin to fade. In fact, for each of these levels, it has also been determined how many days or weeks of day light radiation they are equivalent to, which is also depends on the season and the location, where the printed product will be exposed to the sun. The following figures will give you an overview:

light fastness	summer	winter
step 3	4 – 8 days	2 – 4 weeks
step 4	2 – 3 weeks	2 – 3 months
step 5	3 – 5 weeks	4 – 5 months
step 6	6 – 8 weeks	5 – 6 months
step 7	3 – 4 months	7 – 9 months
step 8	über 1,5 years	

Which factors determine the light fastness of a product?

These timeframes are determined by several print ink factors. A pigment that can be exposed to sunlight continuously without being affected simply does not exist. Triggered by chemical processes, the only factors that can counter act the quick decomposition of the color are the composition, concentration and state of the pigment. The binding agent also plays a role. It decomposes slowly but surely due to the impact of the UV radiation; as does the pigment consistency. To those looking at the print, the decomposition is evident in the fact that the color has faded. Magenta and yellow are more easily affected by these changes than cyan and black. Consequently, the former two colors are expensive to produce in high light fastness levels and cost buyers quite a bit more. The production of high light fastness hues of the latter two colors is considerably less complex.

Light fastness factors

Moreover, the light fastness levels indicated always refer to the full tone of the color. Consequently, any blending of colors, especially brightening using white, always leads to a drop in light fastness levels. In addition to these factors, which determine the light fastness, it is also important to take the quality of the imprinted materials into account, since they absorb ink. Yellowed paper does of course have an adverse effect on even the most beautiful blue. The method used to apply the ink also plays an important role. After all, in practical uses the ink application stipulated in the standard does not always occur. Compared to full tone applications, the thickness of the ink layer is frequently reduced due to half toning. As a result, the ink is diluted and it is easier for UV rays to attack it. Varnish coating or film lamination can frequently prevent these problems, because it sets highlights and – in some cases - can increase the UV resistance of the ink considerably.

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our produces printed products using the flexo printing process and inks that comply with the following light fastness levels:

Magenta and yellow = 6 excellent

➔ 6-8 weeks of direct exposure to sunlight possible during the summer months

Cyan and black = 8 outstanding

➔ more than 1.5 years of direct exposure to sun possible

If your printed product is also film laminated or enhanced with UV resistant varnish coating, you would be safe to assume that it will retain its brilliant colors even after one to two years – despite the high quality ink colors used.

